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COMMUNICATIONS & TECHNOLOGY

JULY 2005

CQ

1945 Our 60th Anniversary 2005

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On the Cover: Brothers James and Robert Lagerstrom, KE6VNN and KE6VNG, of Seaside, California, talk on 2 meters from the beach at Monterey. Details on page 81.

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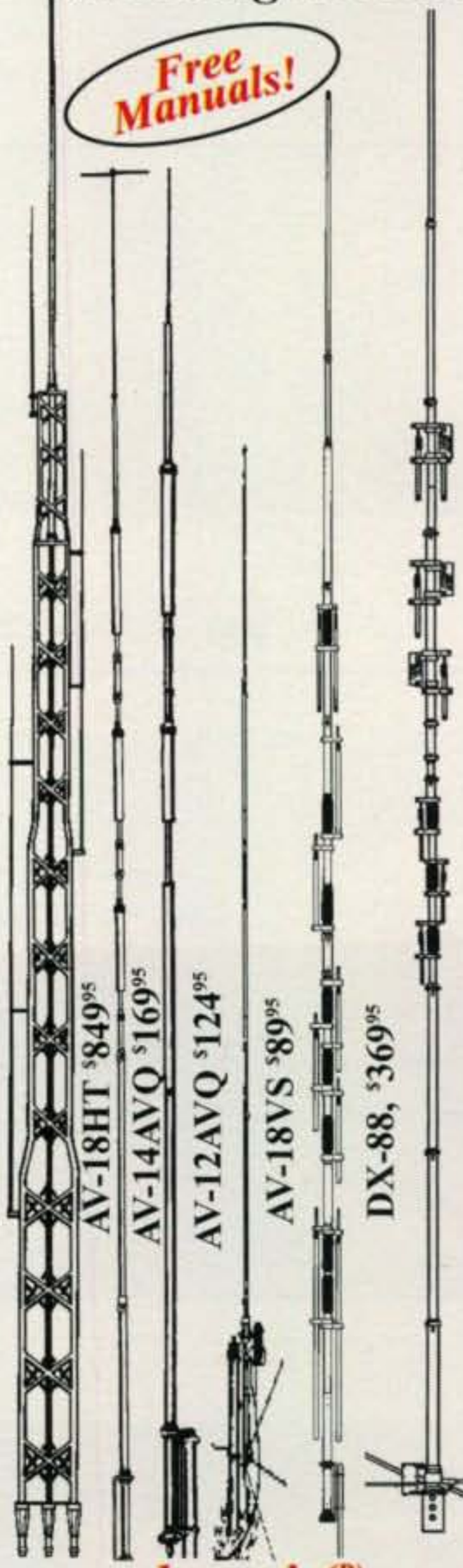

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AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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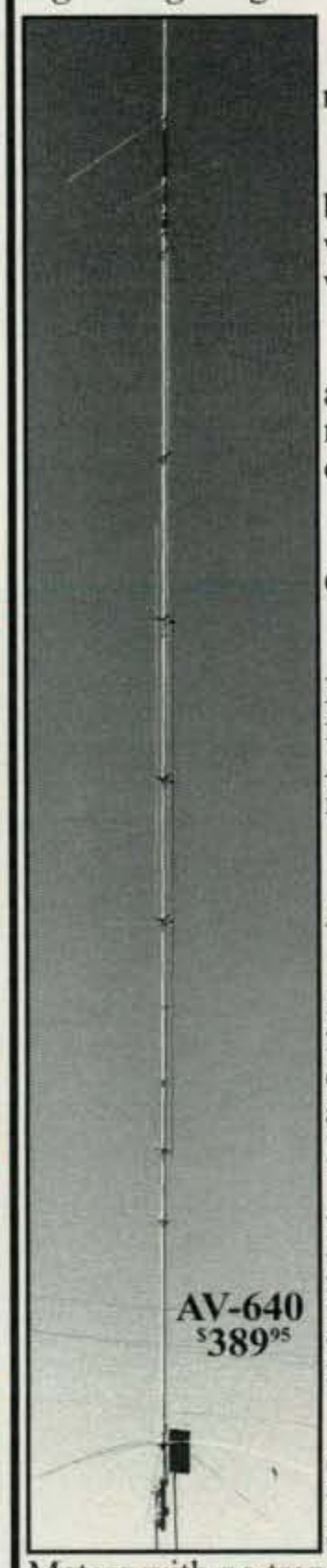

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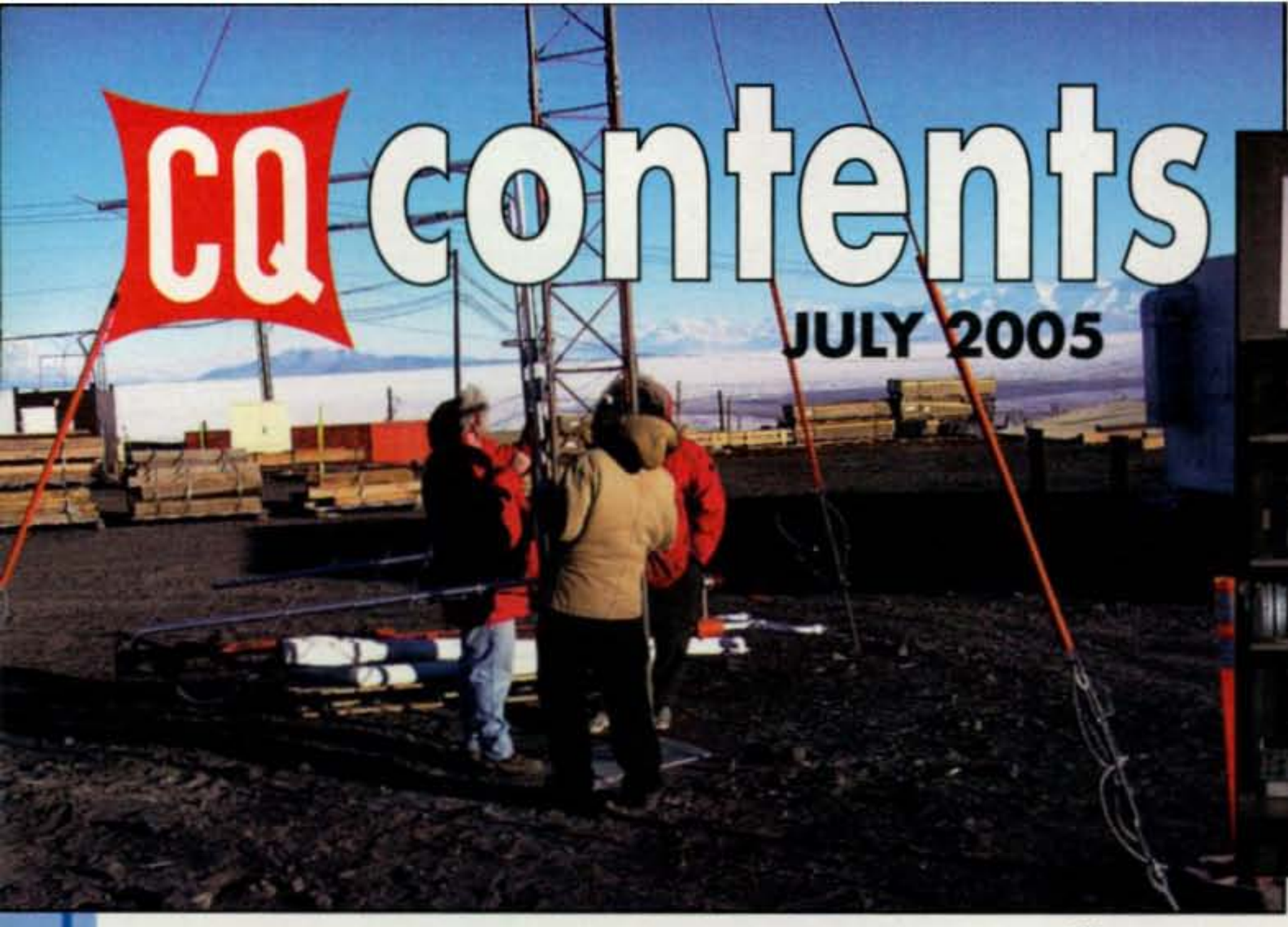

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Ham Congressman Calls for "Full and Complete Analysis" of BPL Interference

Arkansas Rep. Michael Ross, WD5DVR, has introduced a House Resolution calling on the FCC to conduct "a full and complete analysis" of radio interference caused by broadband over power lines (BPL) and to "reconsider and review" its rules on BPL adopted last year. According to the ARRL, Ross introduced H. Res 230 on April 21. It is not a bill that would become law if passed and signed by the President, but rather a statement of "the sense of the House of Representatives." Hams contacting their representatives to urge support for the measure are urged to be careful to refer to it as "H. Res. 230" or "House Resolution 230" to avoid confusion House of Representatives bill number 230 (H.R. 230), which has nothing to do with BPL.

Meanwhile, another member of Congress, Rep. Rodney Alexander of Louisiana, used the opportunity of an appearance before the House Appropriations Committee by new FCC Chairman Kevin J. Martin to ask the chairman about harm to the amateur radio community from BPL. Martin had noted hams' concerns in his statement when the FCC adopted its BPL rules last October, and did so again this time, according to the *ARRL Letter,* which says he told Rep. Alexander that the commission "would attempt to strike a balance with the amateur community with respect to its BPL concerns."

Ex-Ham Arrested on Federal Interference Charges

Jack Gerritsen, ex-KG6IRO, was arrested by the FBI on May 5 and charged with jamming radio frequencies used by the US military, the Coast Guard and other law enforcement and public safety agencies. The US Attorney's office for the Central District of California reported that Gerritsen, of Bell, California, has been charged with malicious interference with a communications system operated by the United States and of transmitting without a license. If convicted on both counts, he could face a prison term of up to 11 years. Gerritsen and the FCC have been playing cat-and-mouse for several years, with the FCC pulling Gerritsen's ham license and issuing fines of more than $50,000 (which the government says have not been paid). Gerritsen was previously convicted on state charges of interfering with police communications and sent to prison. The FCC reported that new interference complaints began coming in soon after he was released. Bail was set at $250,000. There was no word at press time as to whether Gerritsen had been able to raise the bail money. He was scheduled to be arraigned on the new charges on May 31.

FCC Battles Power Companies Over Non-BPL Interference

The FCC's Enforcement Bureau has sent two follow-up letters to power companies in Pennsylvania and New Mexico regarding ongoing interference to hams that has nothing to do with BPL. One case has been going back and forth since late 2002 and the other since mid-2003. In both cases, the FCC said the companies' responses had been inadequate and that the interference problems persist. One company was given 45 days to provide an update on mitigation efforts while the other was threatened with enforcement action if a plan to address the interference problem was not submitted within 30 days.

India Launches VO-52 Ham Satellite

The newest ham radio satellite was launched in early May from India—that country's first ham satellite—known as HAMSAT until it received its official designation as VO-52 (VU-Sat OSCAR 52). The satellite was quickly made available for general use and many reports of activity have been posted on the AMSAT-India website at <http://www.amsatindia.com/hamsat.htm>. It operates SSB and CW in Mode U/V, with uplink on 435 MHz and downlink on 145 MHz.

In other satellite news, it is reported by the AMSAT News Service that UoSAT OSCAR-11 appears to have gone silent. Its beacon was last heard on April 30. UO-11 is one of the longest-lived amateur satellites, operating for more than 20 years since its launch on March 1, 1984!

Monteith Named New Enforcement Bureau Chief

Kris Anne Monteith has been named Chief of the FCC's Enforcement Bureau, succeeding David Solomon, who is leaving the commission to work in the private sector. According to the *ARRL Letter,* Monteith has been with the FCC since 1997 and served most recently as Deputy Chief of the Consumer and Governmental Affairs Bureau, coordinating the FCC's dealings with other governmental agencies and its consumer outreach programs.

The Dits Heard (& Seen) 'Round the World

It started in April in Australia and ended up on "The Tonight Show" on NBC. In mid-April, officials at the Powerhouse Museum in Sydney, Australia, set up a race between what the *Sydney Morning Herald* called "the best that 19th century science could muster"—Morse code—"and the latest in 21st century communications"—cell-phone text messaging.

The competition pitted 93-year-old Gordon Hill, a retired post office telegrapher, and 82-year-old Jack Gibson, against 13-year-old Brittany Devlin and a friend. Both sent the same message—Gibson sending full text ("Hey, girlfriend, you can text all your best pals to tell them where you are going and what you are wearing") while Devlin abbreviated to save time ("hey gt yo can txt ur best pals 2 tel them wot u r doing, wher ur going and wot u r wearing"). The code team won by 18 seconds, then beat back three additional challenges from young texters, according the *Herald.*

The story came to the attention of "Tonight Show" producers, who decided to stage their own competition on the broadcast, featuring "the world's fastest text messager" against two well-known hams, Chip Margelli, K7JA, and Ken Miller, K6CTW. Details of their faceoff are in this month's "VHF-Plus" column (they were on 432 MHz). Hint: Chip could hold his head high at the Dayton Hamvention® the following week.

Morse code was also featured on a National Public Radio program, "The Next Big Thing," on April 29. The show featured excerpts from an 1879 book about an online (telegraph line) romance between two landline telegraph operators, followed by an interview with the ham who provided the realistic clicks and clacks of an old-style telegraph sounder as background sound effects.

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HAM IV and HAM V Rotator Specifications	
WindLoad capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power (in lbs.)	800
Brake Power (in lbs.)	**5000**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	26
Effective Moment (in tower)	**2800 ft/lbs.**

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TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power (in lbs.)	1000
Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
Effective Moment (in tower)	**3400 ft/lbs.**

CD-45II

CD-45II
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CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power (in lbs.)	600
Brake Power (in lbs.)	**800**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	22
Effective Moment (in tower)	**1200 ft/lbs.**

HAM-V

HAM-V
$949.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

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MSHD, $99.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
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For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. 2 1/16 inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power (in lbs.)	350
Brake Power (in lbs.)	**450**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight (lbs.)	14
Effective Moment (in tower)	**300 ft/lbs.**

HDR-300A

HDR-300A
$1379.95

For ***king-sized*** antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power (in lbs.)	5000
Brake Power (in lbs.)	**7500**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight (lbs.)	61
Effective Moment (in tower)	**5000 ft/lbs.**

Digital Automatic Controller

DCU-1
$649.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1 degree accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

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a CQ editorial

BY RICH MOSESON,* W2VU

Pardon the Bandwidth . . .

This month's "ZB" is a bit longer than usual, so, as they say on e-mail lists when a message is going to be particularly long, "pardon the bandwidth," which is appropriate since bandwidth is our topic of discussion this month. — W2VU

You know, it really is too bad that just about anytime the ARRL proposes a significant change in the way the Amateur Radio Service is structured or governed, it always seems to leave enough question marks to give the conspiracy theorists something to hang their hats on. Invariably, whenever a change is proposed, somebody feels that they're going to lose something—even if it's just the perception of something—and just as invariably, some members of those groups decide that the League's entire purpose in making its proposal is to hurt *them*. Unfortunately, the folks up in Newington seem to have this habit of making it easy for those folks to jump to those conclusions. The current proposal to change the way our subbands are regulated is a case in point.

Later this month, the ARRL Board of Directors will vote on a proposal that's been in the works for over a year to ask the FCC to change from regulating subbands by *mode* (CW, RTTY, phone, etc.) to *bandwidth* (200 Hz, 500 Hz, 3 kHz, etc.). When the board's Executive Committee approved some fine-tuning on the plan in April, the League-bashers and conspiracy theorists came out in droves on the internet discussion boards such as eham.net and qrz.com. Problem is, in between some people's paranoia and some people's efforts to turn virtually any discussion into a code/no-code debate, there were some valid points made. And there were contributors to the discussion who were neither paranoid nor code-obsessed and who had legitimate concerns. Those legitimate concerns need to be taken seriously.

While we agree with the League that the current model of regulation by mode is outdated and does not provide for certain hybrid modes such as digital voice and MFSK-16, and we continue to support the *concept* of bandwidth regulation (see "Zero Bias," November 2004), we continue to have problems with some of the specifics of the ARRL's plan and feel that further changes are necessary. However, it is more a matter of additional fine-tuning than of scrapping the whole plan and starting again.

Problem #1: The "Digital Conspiracy"

No, I don't believe the bandwidth regulation proposal is a conspiracy by digital enthusiasts to "grab" frequencies from analog users, as some allege, nor is it a sinister plot to fill the HF phone bands with remotely controlled robot stations sending e-mail to hams via "WinLink" without regard to who else may be on frequency or the interference they may cause, as others fear.

The ARRL says that even though its bandwidth-regulation proposal would legally permit these stations to operate on all of the same frequencies as analog voice stations, their operating frequencies in reality will be limited by band plans. In addition, says the ARRL, the interference potential is overblown because the semi-automatic robot stations at issue won't transmit until they are "brought up" by "live" operators at other stations. We still see two problems:

1) The nature of HF propagation—a well-meaning and considerate operator could listen carefully and hear no other stations on or next to the robot's frequency and still cause interference when bringing up the remote transmitter. That's because he can't hear what activity may be present at the remote site. If I'm in New York and want to access a WinLink station in St. Louis, there may be stations on the West Coast that I can't hear, but who can be heard in St. Louis, and are subject to interference when I bring up the robot transmitter.

2) The nature of unattended transmitters. Since there's no one there to turn the tuning dial, unattended stations are necessarily fixed-frequency devices. While the technology exists in the commercial world to remotely change the frequency of a station, it hasn't yet become affordable enough to find a home on the ham bands. Practically speaking, it's not feasible for a robot station in the Amateur Service to change frequency to avoid interference.

ARRL Executive Vice President Dave Sumner, K1ZZ, argues in his June *QST* editorial that strong band-planning will prevent encroachment of digital robots into traditional phone subbands and likewise, encroachment of phone stations into traditional digital subbands. While the vast majority of hams will go along with voluntary band plans, there will always be a few—whether they are contesters looking for space on an overcrowded band or digital robot operators looking for more "private" frequencies—who will say, "I don't care about the band plan, I only care about the rules and the rules say it's legal for me to be here." The only way this could possibly work is for the FCC to write into its rules that violations of an accepted band plan are considered poor amateur practice and are therefore prohibited.

Problem #2: "Legacy Modes"

The ARRL's commendable effort to protect so-called "legacy modes" is done in a way that defeats the whole purpose of the bandwidth regulation proposal and at the same time, unintentionally (we hope) excludes at least one other present operating mode. To again quote the editorial in June *QST*, the League says "The FCC rules should not stand in the way of where technology takes us in our fulfillment of the bases and purposes of Amateur Radio. On the other hand, present operating modes (including AM) should continue to be permitted for as long as there are amateurs who wish to use them."

Under the League's plan, the maximum permitted bandwidth in the current phone subbands would be 3 kHz, the approximate bandwidth of a standard SSB signal, except that stations using AM would be permitted 9-kHz wide signals and stations using independent sideband, or ISB, could occupy up to 6 kHz. Again, we have problems here, three this time:

1) While there is a significant subgroup of hams who enjoy using AM, how many of you out there operate ISB? How many of you even know what it is? Too many of us just gloss over it, assuming it's something we *should* be familiar with and won't risk embarrassing ourselves by asking about it. Confession: Before reading this plan, I had never heard of independent sideband. Apparently, neither had a whole lot of other people whose technical knowledge far exceeds mine. I started asking around (thank you to all who responded), and learned that ISB is a double-sideband mode (with or without the carrier) on which *different information* is encoded on each of the sidebands. It's been used by the military, mostly to try to improve speed and throughput on RTTY circuits, and it's used in some

(Continued on page 111)

*e-mail: <w2vu@cq-amateur-radio.com>

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announcements

Great Plains Super Launch 2005 – The fifth annual GPSL will be held July 1–3 in Omaha, Nebraska. Hosted by the Nebraska Stratospheric Amateur Radio group, GPSL 2005 will bring together Amateur Radio High Altitude Ballooning groups to share information and participate in simultaneous flights. For more information, see this month's "VHF Plus" column by N6CL, and also go to: <http://www.superlaunch.org>. Questions may be directed to Mark Conner, N9XTN, at <n9xtn@cox.net>.

The following special event stations are scheduled for July:

K1USN, from Museum Ship Radio Event, worldwide; USS Salem Radio Club, Quincy, Massachusetts; 0001Z July 16 to 2359 July 17 on 3.539, 3.860, 14.039, 14.260 MHz. For certificate work at least ten of the participating museum ships and send a copy of the log to Bob Callahan, W1QWT, 56 Acorn Street, Scituate, MA 02066 with $2.00 donation for printing and mailing expenses. <www.qsl.net/ k1usn/event.html>

KA4OIL, from Summer Motion '05 Fun Festival, Central Park, Ashland, Kentucky; River Cities ARA; July 2, 8:30 AM to 3:00 PM local time on 3.940, 7.250, 14.300, 28.400 ±. QSL info: RCARA, P.O. Box 612, Ashland, KY 41105; <http://www.summermotion.com>.

WD6MM, from 50th anniversary celebration of Disneyland, California; Disney Emergency ARS; 1700Z July 17 to 0300Z July 18 on 28.350, 21.350, 14.250, 7.250 MHz, and Disneyland 2-meter repeater. For certificate send QSL and 9×12 SASE to DisneyEARS, c/o Archie Willis, W6LPJ, 9276 Borden Ave., Sun Valley, CA 91352.

W7P, from Sternwheel Tug "Portland" during the Museum Ships Weekend; Oregon-Idaho DX Group; 0001Z July 16 to 2359Z July 17 on 3.539, 3.860, 7.039, 7.260, 14.039, 14.260, 21.039, 21.360, 28.039, 28.360 MHz. For QSL send QSL and SASE to K7VAN, Box 12941, Salem, OR 97309 (or via the bureau).

W7WV, from centennial of the incorporation of the City of Klamath Falls, Oregon; 1600Z July 4 to 0300Z July 5 on 14.250± and 7.250±. QSL to Douglas Clarke, N7KF, 4801 Glenwood Drive, Klamath Falls, OR 97603.

K0YY & K0CRG, from Bridge Island #CO-12, grid DN60, in Routt County, northern Colorado; Castle Rock Repeater Group of Denver; July 8–18 on SSB/CW/RTTY, 3.530, 3.960, 7.030, 7.260, 10.115, 14.030, 14.260, 18.075, 18.160, 28.030, 28.460, 50.130 MHz. QSL to K0YY; e-mail: <k0yy@arrl.net>, <www.crrg.org>.

The following hamfests, etc., are slated for July:

July 9, **South Milwaukee ARC Swapfest,** American Legion Post #434, Oak Creek, Wisconsin. Contact South Milwaukee ARC, P.O. Box 102, S. Milwaukee, WI 53172-0102; <www.qsl.net/wa9txe> and select page "swapfest." (Talk-in 146.52)

July 10, **Valley Forge Hamfest & Computer Fair,** Kimberton Fire Company Fairgrounds, Valley Forge, Pennsylvania. For table reservations contact N3ORH, e-mail: <reservations@marc-radio.org> or call 610-327-8666; general information: MARC, P.O. Box 2154, Southeastern, PA 19399-2154, <http://www.marc-radio.org>. (Talk-in 145.1300 and 147.0600 PL 131.8)

July 10, **Sussex County ARC Hamfest,** Sussex County Fairgrounds, Augusta, New Jersey. Contact Dan, N2ERH, 973-948-6999; e-mail: <hamfest@scarcnj.org>; <http://www.scarcnj.org>.

July 15–17, **Ham Holiday 2005,** Oklahoma State Fair Park, Ft. Supply, Oklahohoma. Contact Central Oklahoma radio Amateurs, Ham Holiday 2005, P.O. Box 265, Ft. Supply, OK 73841-0265; <www.qsl.net/coranews>. (Talk-in 146.82; exams)

July 15–17, **Glacier Waterton International Hamfest,** Glacier Meadow RV Park, East Glacier, Montana. Contact Harley Leach, 4620 Conestoga Circle, Bozeman, MT 59715-9218; <www.gwhamfest.org>.

July 16, **Cary ARC Hamfest,** Cary Town Hall Campus Parking Deck, Cary, North Carolina. Contact Cary ARC, P.O. Box 53, Cary, NC 27512; e-mail: <n4nc@arrl.net>. (Talk-in 146.88 –0.6; exams 10 AM)

July 16, **NOARSFEST,** Lorain County Fairgrounds, Wellington, Ohio. Contact Tom Porter, W8KYZ, 161 Herman Road, Avon Lake, OH 44012.

July 23, **OH-KY-IN Hamfest,** Diamond Oaks Career Development Campus, Cincinnati, Ohio. Contact Bruce Vanselow, N8BV, 513-251-1555, e-mail: <n8bv@juno.com>; <www.ohkyin.org>. (Talk-in 146.670–; exams 9 AM)

July 24, **BRATS Maryland Hamfest,** Howard County Fairgrounds, West Friendship, Maryland. Contact BRATS, P.O. Box 5915, Baltimore, MD 21282-5915; phone 410-461-0086. (Exams 9 AM)

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Every four years, Boy Scouts from around the country gather for a "National Jamboree" - being held this year from July 25 to August 3. Ham radio has always been a participant and its involvement is growing. N2COP looks at the past, present, and future of ham radio at the Boy Scout National Jamboree.

K2BSA

Amateur Radio at the Boy Scout National Jamboree

BY BILL MORINE,* N2COP

Quadrennial events are big and special because they take place only once every four years. There are the national presidential elections and the Olympic Games, and then there's the Boy Scout National Jamboree. This year marks the 16th national gathering since the first one took place on the National Mall in Washington, D.C. in 1937. The numbers attending the event are staggering: 33,000 scouts, 7500 leaders, and up to 10,000 visitors on the nights of special productions called "Arena Shows" (see the sidebar "By the Numbers" for more statistics). How big is the Jamboree? The President of the United States usually makes a personal appearance at one of these Arena Shows.

Fort A.P. Hill in Virginia will be the site for this year's Jamboree, as it has been for several of the past gatherings, and amateur radio will be a major part of the Jamboree, which runs from July 25th to August 3rd. Amateur radio and Scouting both got their starts around the turn of the 20th century, and the two institutions have enjoyed a harmonious relationship over the years. Amateur radio has had a presence at every Jamboree, but the size of its operations has grown with each Jamboree. Approximately 10 percent of all Jamboree attendees will be exposed to amateur radio during their stay at Fort A.P. Hill. This year a staff of 50 volunteers will demonstrate amateur radio through three major activities: teaching of the Radio Merit Badge, Technician Class licensing courses and volunteer examinations, and the showpiece of amateur operations—station K2BSA/4. All three amateur radio operations operate under the banner of "K2BSA."

About K2BSA

K2BSA's call letters were assigned long before vanity calls through a special arrangement with the FCC. Until the 1980s, the national headquarters of Boy Scouts of America was located in 2-land, first in Manhattan and later in New Jersey. In the 1980s, headquarters relocated to Irving, Texas, and the coveted callsign traveled south with it. Today K2BSA's license is domiciled in Texas, but special recognized scouting events permit suffixes to be added. While at the Jamboree in Virginia, the station technically will be K2BSA/4.

"Home" for ten days to the 50 staff members of K2BSA is a big tent where they welcome thousands of scouts to see and hear ham radio in action—and if they're already licensed, to get on the air themselves. (Photos courtesy K2BSA; logos courtesy Boy Scouts of America, used by permission.)

In addition to the 50 staffers, consisting of both adults and licensed youth, several hundred additional licensed amateur operators who aren't assigned to K2BSA will attend the Jamboree. They will be able to stop by the K2BSA tent during their stay, and upon showing a copy of their license and signing the guest log, they will have an opportunity to work one of 11 operating positions (there are no advance operating skeds; a sign-up sheet is posted outside the station when the Jamboree opens, and guest operators are accommodated on a first-come, first-served basis). K2BSA is literally under a "Big Top," a striped circus tent. Inside there are three HF positions plus one each for ATV, SSTV, digital, satellite, VHF

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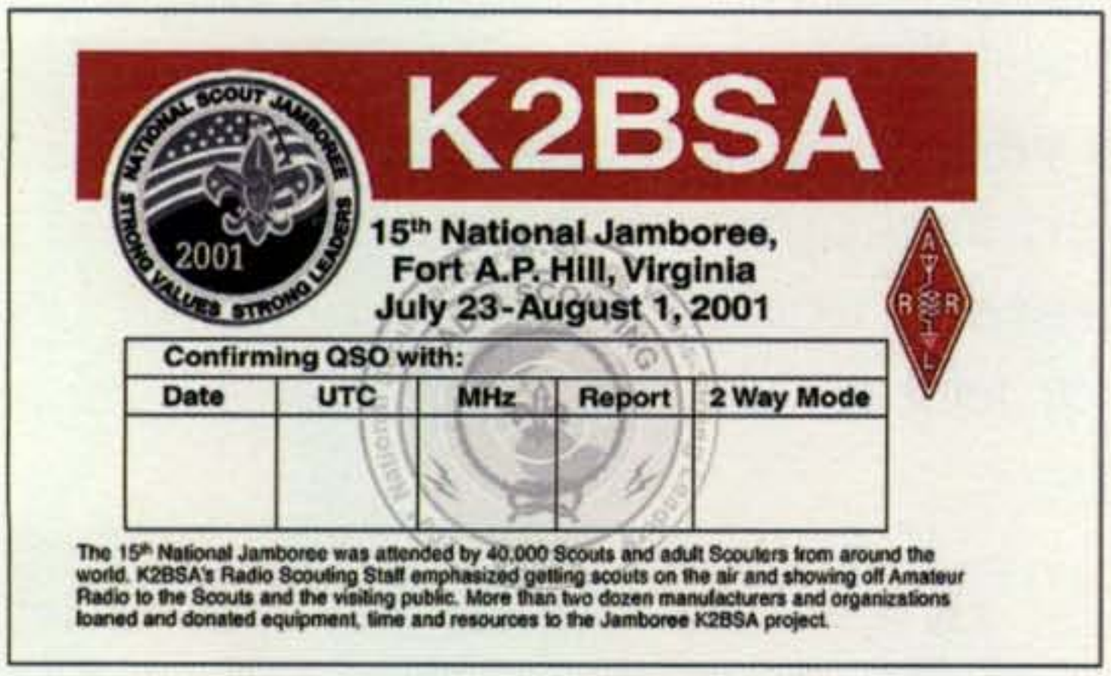

K2BSA QSL card from the 2001 National Jamboree, also held at Fort A. P. Hill, Virginia. See sidebar for QSL info for the 2005 Jamboree station.

multimode, BBS packet, and a repeater monitoring post. Modular partitions separate each position. Remember, this is scouting, so the K2BSA tent is not air-conditioned. Despite the heat, humidity, and cacophony, there is no trouble making QSOs. Because K2BSA is a rare call, pile-ups start on day one and go round the clock until the plugs are pulled ten days later. The grins from the operators let you know this is a DXpedition in the middle of a 60,000-acre army base halfway between Richmond and Washington, D.C.

The trustee for K2BSA is also the director of amateur radio operations at the National Jamboree. He's Ray Moyer, WD8JKV. Ray is employed in the International Division of the Boy Scouts of America. He has been head of the K2BSA operation at the National Jamboree since 1987. "The biggest changes in K2BSA over the past few Jamborees have been the increase in the number of operating positions and the inclusion of licensing classes and examinations. We are now one of the biggest exhibit areas at Jamboree," exclaims Moyer.

K2BSA staff members are a blend of 45 adult leaders and five scouts, referred to as "Youth" if they are under 18. Although there is no requirement to have a higher grade license, every adult staff member holds an Extra Class ticket. The Youth members hold either Technician or General class licenses. Slightly less than half of the staff are returning veterans and the other half are rookies. Getting a slot on the staff of K2BSA is akin to college admissions, because many more apply than are accepted.

Like most DXpeditions, creature comforts take a back seat. Everyone lives in large olive-green tents like the kind in the TV show *M*A*S*H*. What little sleep you get is on cots on top of dirt. After a thunderstorm, staffers shovel sawdust under their cots to soak up standing water. The temperature can easily reach 95°F with a heat index over 100° when humidity is factored in. During the day, fans drone in the background at the K2BSA tent as speaker volumes are turned up to compensate for the added noise. XYLs shake their heads and wonder why grown men would subject themselves to such harsh conditions.

The fellowship garnered from the Jamboree and K2BSA more than makes up for the hardships. Take Bob Johnson, K3RC, from Stony Ridge, Ohio. This Jamboree will be Bob's tenth tour on the staff of K2BSA. Bob got the Jamboree bug as a scout in 1953 when he took a special train just for Jamboree-bound scouts from his hometown to Pasadena, California, site of that year's gathering. After he got his ham radio license, Bob wanted to remain in scouting and especially be part of the Jamboree. On the staff of K2BSA, he has specialized in the movement of message traffic, evolving with technology. Because of the volume of messages, phone and CW messages were replaced in the 1970s with Baudot code (RTTY) paper tapes. "One night a rain storm got the paper strips wet. I placed them on an amplifier to dry them out. Soon they were dry and we could feed them through the machine," says Bob.

Today the major cell-phone providers roll in portable cell towers mounted on trailers to handle the increased volume of telephone calls in and out of the Jamboree. Radiograms to and from scouts don't have the appeal they did years ago, but Bob maintains a packet station to move a still-healthy number of messages in and out of the NTS system.

Because of his tenure as the longest serving member on the K2BSA staff at National Jamborees, Bob's earned the nickname the "Dean" of the operation. If Bob is the "Dean," then Shelly Weil, K2BS, is the "Ambassador." 2005 will mark Shelly's 19th Jamboree. Those of you doing the math will pick up that this seems impossible, since there have only been 16 National Jamborees. In Shelly's case, he has also attended the international counterpart to the National Jamboree, the World Jamboree, nine times. Since 1971 Shelly has operated from World Jamborees in Japan, Norway, Canada, Australia, South Korea, the Netherlands, Chile,

By the Numbers:
2001 National Jamboree Statistics

Number of Scouts Attending: 33,000
Number of Leaders Attending: 7,500
Number of K2BSA Staff Members: 42
Number of Hours On The Air Daily: 23
Number of Station Positions: 11 (All modes)
Number of QSOs: 5,000+
Number of Countries Contacted: 109
Highest Number of Check-Ins to Nightly Net: 67
Candidates Who Sat for VE Exams: 182
Number of Technician Licenses Earned: 73
Number of General Licenses Earned: 11
Number of Extra Licenses Earned: 3
Highest Number of VE Examiners at One Session: 25
Highest Number of Candidates at One Exam Session: 72
Number of Scouts Enrolling in Radio Merit Badge: 783
Number of Scouts Completing Badge at Jamboree: 501

Most K2BSA staffers work away from the station, instead teaching Radio Merit Badge to scouts, as in this photo, or leading licensing classes and test sessions.

There are lots of big tents at a National Scout Jamboree, but it's still pretty easy to pick out the one that houses the ham station! Eleven operating positions inside the K2BSA tent will keep the station active on HF, VHF, UHF, phone, CW, PSK-31, SSTV, and ATV. In addition, the K2BSA staff runs two repeaters for communications within the 3000-acre Jamboree site.

and Thailand. Active in promoting international scouting, Shelly and his wife have sponsored many trips of foreign scouts visiting the United States.

Whether he's at the National or World Jamboree, Shelly brings with him the trusted Vibroplex bug that he had when he was in the Signal Corps at Ft. Dix, New Jersey, in the 1950s. During the day Shelly concentrates on phone for the benefit of the scouts, but in the wee hours of the night he pounds brass and searches for DX.

"I've made many friends around the world through the Jamborees," explains the Delray Beach, Florida retiree. "To me, the greatest thrill is when I'll make a QSO and the person at the other end tells me, 'Hey, I remember your call. You showed me amateur radio when I was a scout at Jamboree. You inspired me to get my ticket. Thanks.'."

Like all K2BSA staffers, Shelly has had to improvise under adverse conditions. At one of the earlier National Jamborees, the top of the tent developed a small hole which later dumped a large amount of rainwater into an amplifier. Shelly put the amplifier into an oven at a nearby mobile kitchen unit, and within hours it was dry and on the air again with no side effects.

On-Site Communications, Too

Amateur radio plays a large role in logistics at the Jamboree, which covers 3000 acres of Ft. A.P. Hill's total 60,000 acres. The Jamboree is divided into 20 sub-camps. Because these tent cities exist for only ten days, the cost of building a permanent communications infrastructure is prohibitive. Although cell-phone carriers do roll in temporary repeaters, the intense volume of cell calls often overwhelms their networks. There are some rudimentary private two-way radio communications among the Boy Scout organizers, but normal communications is fairly primitive. When essential information needs to be relayed, K2BSA steps in. Amateur radio operators, both adults and Youth, are encouraged to register with K2BSA at the start of Jamboree. The goal is to have an amateur radio operator in every sub-camp, an objective that is usually accomplished.

To get the word out to the field, K2BSA operates two temporary repeaters—one on 2 meters and the other on 70 centimeters—and runs an internal net every night at 7:00 PM. Check-ins are taken by sub-camp, and the number of check-ins ranges from 40 to a high of 67. The repeaters are housed in a trailer behind the K2BSA operating tent, and their antennas are mounted about 30 feet in the air on adjacent telephone poles. Coverage across the Jamboree area is excellent, and cars traveling on nearby I-95 often check-in. Fort A.P. Hill lies in the coastal plain just west of Virginia's Tidewater region. It's thunder-boomer country, and severe thunderstorms do shut down Jamboree activities on occasion. At these times, the 2-meter repeater becomes a SKYWARN advisory service, alerting sub-camps on weather conditions and when it's safe to resume activities.

The repeaters serve another vital function—a quick QSO confirmation. There is so much to do at a Jamboree that even the most avid ham radio operator will find himself distracted by the hundreds of other organized activities. If a ham wants to pick up a K2BSA QSL card, it's easy. The repeaters are monitored 18 hours a day by a staff member. A quick QSO is logged, and the operator can later stop by the K2BSA tent to pick up his treasured card.

Off-the-Air Activities

The K2BSA tent is the crown jewel of amateur radio at the Jamboree, but only 20 of the 50 K2BSA staff members are dedicated to on-the-air operations. The remaining 30 are assigned to the two other major portions of the K2BSA mission—teaching the Radio Merit Badge and Licensing and Examinations. The bulk of K2BSA staff members concentrate on teaching the seven sections of the Radio Merit Badge. Bill Burns, WA6QYR, leads the 18 instructors who teach the badge. If a scout stays focused—a task that's hard to do at Jamboree when you're surrounded by so many fun things to do_he can complete the Radio Merit Badge in about six hours.

Bill, a microwave enthusiast from Ridgecrest, California, is proud of the 783 scouts who signed up to take the badge at the 2001 Jamboree. By the close of the Jamboree, 501 had completed all of the requirements, an astounding 64% completion rate. Those who don't finish all the requirements of any of the Boy Scouts' more than one-hundred merit badges, all of which are offered at Jamboree, can take home what's called a "partial" completion and finish up the badge at their home troop.

To complete the badge, a scout travels through a series of makeshift classrooms under (what else?) a tent, in this case a long tent that is subdivided with partitions. Radio Merit badge classes are located in a large field filled with identical long tents in parallel rows called "Merit Badge Midway." Here scouts run from tent to tent to earn merit badges, one of only dozens of organized activities at the Jamboree.

Scouts sit through the first six of the seven requirements for the Radio Merit Badge in classes at Merit Badge Midway. The final requirement for the badge, #7, permits the scout to choose one of three courses of study to complete the badge. He can elect to concentrate on amateur radio, shortwave listening, or broadcast radio. K2BSA manages the amateur radio and shortwave listening sections. Those who elect the broadcast segment attend sessions run by QBSA, the on-site, low-power commercial FM station that provides news and entertainment during the Jamboree. QBSA is run by commercial-broadcast managers, but much of the programming comes from the scouts themselves. K2BSA enjoys a har-

K2BSA Contact and QSL Info

Meters	K2BSA/4 Frequencies Phone	CW
80	3.940	3.590
40	7.290	7.030
20	14.290	14.070*
15	21.360	21.140
10	28.360	28.190

All HF frequencies are approximate and will QSY with respect to nets and on-going QSOs.

*Acknowledged PSK-31 frequency. Rather than CW, K2BSA/4 will participate in PSK-31 mode near this frequency.

Temporary K2BSA/4 repeaters at Fort A.P. Hill will be 145.17 (–) and 447.90 (–), each with 100-Hz PL tone.

Messages may be sent via NTS to K2BSA. In the header, put the name of the scout or the leader and the number of the troop at Jamboree (Jamboree troops have different numbers than individual scout troops, as they tend to be made up of scouts from many troops in a scout council), then route to K2BSA at Ft. A.P. Hill, Caroline County, VA. If the scout or leader's troop number at Jamboree is not known, then list the troop number from home, the name of the home Scout Council, the home state, and the number of their sub-camp (1 through 20).

QSL Information (include SASE):
K2BSA, c/o Ray Moyer S219
Boy Scout National Headquarters
1325 Walnut Hill Lane
Irving, TX 75062-2079

It takes a big staff to run the Jamboree special-event station plus merit-badge and licensing classes. The 2001 staff, seen here, had 42 members. Fifty hams are expected to staff K2BSA at the 2005 Jamboree later this month.

monious relationship with QBSA, "The Eagle Voice at 95.1. FM."

Those scouts who choose amateur radio as their final merit badge requirement are herded through the K2BSA tent in small groups. The badge mandates that they listen to a 10-minute QSO. There is a thrill for K2BSA operators when they see a scout's face light up at talking to a friendly voice far away. Those not at the microphone have to keep a log showing the call letters of stations heard and contacted, name of the operator, frequency, date and time in UTC, and RST. This requirement explains one of the reasons why a ten-day special-event station such as K2BSA has a low number of QSOs.

By design, K2BSA is a ragchew operation that encourages warm exchanges and healthy dialogue. Even when pileups occur, conversations are not the rat-a-tat-tat contest type, but rather leisurely chats. Many scouts and scout leaders who can't attend the Jamboree check-in and chew the fat about favorite scout subjects such as camping, activities, hiking, and food.

The smallest number of Radio Merit Badge participants choose shortwave listening as their final requirement. The SWL team (two instructors) has two positions set up in the classroom tent in the Merit Badge Midway away from the K2BSA amateur station. Despite the decline of shortwave radio transmissions beamed to North America, the SWL team deftly displays techniques to snag signals from exotic places such as Radio Austria, Vatican City, and Ecuador's HCJB. Scouts have to sit for two four-hour listening periods, one in the morning and one in the evening, to fulfill this requirement. Those scouts who finish their Radio Merit Badge through shortwave listening are looked upon with special respect, because it is the most time-consuming of the three final-requirement badge options.

Those scouts and leaders who get the amateur radio bug at Jamboree can attend classes to earn their Technician class license. Tennessee civil engineer Dave Gaddis, KE4KPC, heads the seven-member Licensing and Examination team. Describing changes for the 2005 Jamboree, Dave says, "We're bowing to the interest of having one intense session of license training, rather than shorter classes over several days." This year candidates will be able to sit for one six-hour session followed by Q & A, then proceed to a Volunteer Examiner exam session that evening. Dave estimates somewhere between 300 and 400 will attend Technician training classes, with about 50% expected to pass their exams while at Jamboree.

The VE team has six nightly examination sessions scheduled during the ten-day Jamboree. Anyone who's an ARRL-accredited VE can help administer the exams, which run about four hours on the last night of the Jamboree. In 2001, 72 candidates sat for the last exam session, which went until 11 PM. The ARRL works closely with K2BSA and tries to process the CSCEs of those examinees who succeed at the early sessions so they can have their call letters assigned before Jamboree concludes. Upwards of 50 VEs will pitch in during Jamboree, many of them not K2BSA staff members who take time from their other assigned duties. At the 2001 Jamboree a total of 182 candidates sat for exams, which resulted in 73 new Technicians, 11 upgraded Generals, and three upgraded Extras. Dave Gaddis anticipates over 200 people will take amateur radio tests over the six examination sessions at this year's Jamboree.

With the sunspot cycle ebbing and HF conditions presenting a challenge, officials acknowledge that contacting K2BSA could be challenging. This year special emphasis is being placed on PSK-31 transmissions, which can punch through QRM. Also, there will be more SSTV pictures. If you miss making contact with K2BSA this year, don't worry. The next Jamboree will be in five years in 2010 to coincide with the 100th anniversary of scouting in America. By then the sunspot cycle should be more favorable. If you hear K2BSA, give them a shout and make a boy's day…and a leader's day too. ■

Radio Scouting Websites

On K2BSA in general and its history: <http://www.bpmlegal.com/k2bsa.html>.

On the National Jamboree in general: <http://www.scouting.org/jamboree>.

Discussion group on amateur radio and Scouting: <http://groups.yahoo.com> and go to ScoutRadio.

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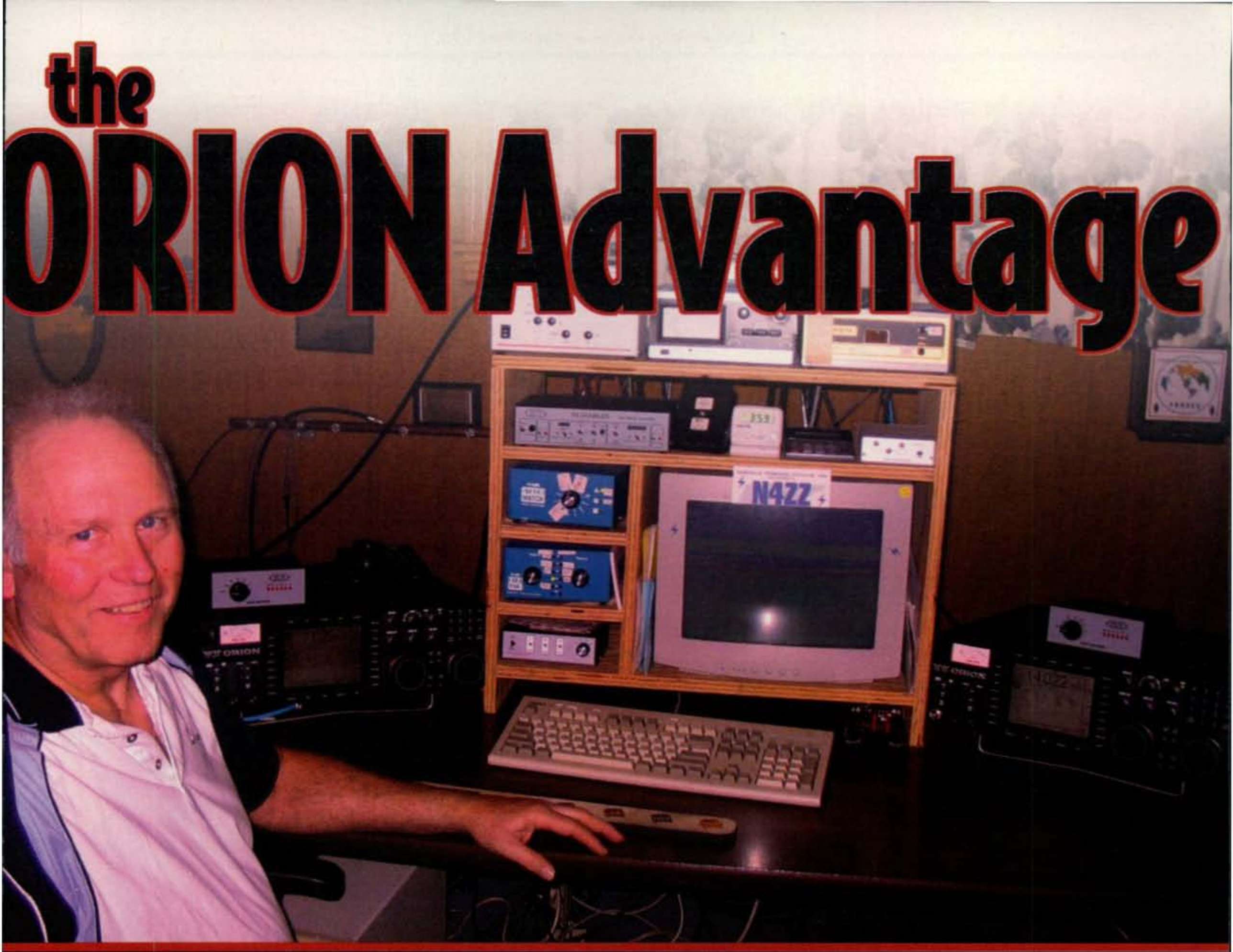

Don Binkley, N4ZZ, has been serious about amateur radio since obtaining his first license in 1957. Contests, DXing, ragchewing everyday with his friends on SSB and CW—Don does it all. Last year his friends kept telling him, "Don, you've got to try an Orion!", but Don wouldn't listen. He had a top-of-the-line HF transceiver from another company that he thought couldn't be beat. Why change? Then WB4QDA bought an Orion. W8KEB got one, too. And NA9F. So...Don decided he'd better try the Orion "just in case."

He could hear signals his other rig couldn't. Full break-in CW had never sounded so good. Everyone raved about the sound of the tailorable transmit audio. Operating contests were never so much fun! His friends had been right all along. That other top-of-the-line rig? Don sold it. He had to. He liked the Orion so much, he wanted to buy a second one for the operating table in his shack.

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You may have heard of "Take Our Daughters and Sons to Work Day." For this year's event, one ham's wife took the program a step further, enlisting her husband and several other amateurs to put on a special program to make it ...

Take Your Ham to Work Day

BY RICH MOSESON,* W2VU

What do you get when you put 100 kids in a room full of enthusiastic hams and ham equipment? Fun, excitement, and lots of dits and dahs flying through the air.

Today I learned about radios and Morse code. It was fun because I learned the Morse code alphabet. I had fun learning about radios, too. I even got to use Morse code. I sent "Zackry" in Morse code to someone. Someday I might just be a Morse code teacher.
— Zackry Grace, age 8

On the fourth Thursday in April, each year, parents around America are encouraged to pull their 8- to 12-year-old children out of school for a day and "Take Our Daughters and Sons to Work®" instead, giving them a sense of what their parents' jobs are all about and ideas for their own future careers.

Your career choice is probably one of the most life-altering decisions you will have to make. Throughout the years, I have had many ideas as to what I want to have as an occupation. However, there is one thing I keep coming back to: Attorney ... I have always wanted a job that helped people but not one that makes it obvious, like a doctor or a firefighter ... I am positive I want the word "Attorney" to be under the word "Occupation" on my resume.
— Amanda Haasz, age 14

Today, according to the Ms. Foundation for Women, which started the program in 1993 (see sidebar), more than16 million children and thousands of businesses participate in "Take Our Daughters and Sons to Work Day."

Some of the 100-plus kids who attended the Piscataway Amateur Radio Club's ham radio program at the IEEE Operations Center in New Jersey on "Take Our Daughters and Sons to Work® Day," April 28, 2005 (Photo by Rosemary Tennis, IEEE)

When I grow up I want to be a teacher, a scientist, and a doctor. I can be all three things if I work and teach in a medical school or hospital. I would like to teach people how to help others who are ill to get well. If they are sick, I would tell them to eat soup and check their temperature. People will be better when I'm done.—Ghilene Joseph, age 7

Many larger companies organize special activities, among them the Institute of Electrical and Electronics Engineers (IEEE)[1], which invites employees' children up to age 15 and has had a variety of kids' programs over the past few years at its Operations Center in Piscataway, New Jersey. Curiously, though, none of the IEEE's past programs has had any connection to electronics. That changed this year when Peg Pascale, who works in the institute's controller's office and whose husband is Rich, W2PQ, suggested doing a ham radio program.

Once the idea was accepted, Rich approached his club, the Piscataway Amateur Radio Club, about helping out. Several members agreed to pitch in, and the ham radio demonstration became one of three activities organized for the kids that day. The others were on Creating a Newsletter (from which most of the kids' quotes in this article are taken), plus a brief session on conversational Spanish. This article, of

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Rich Pascale, W2PQ, explains the morning's events to the kids in the audience. (Dan Moseson photo)

course, will concentrate on the ham radio program.

Very Good Machines

My Uncle George is a ham radio person. He uses walkie-talkies, radios, signals, and Morse code. Ham radio's real name is amateur radio. Ham radios look like walkie-talkies. They are very useful. Ham radios can help our world because they are very good machines.
—Caroline Nielsen, age 8

Seven hams participated in the program, mostly members of the Piscataway ARC. The group included coordinator Rich Pascale, W2PQ; Larry Makoski, W2LJ; Drew Moore, W2OU; Victor Pennetta, KC2NBC; Jack Muhlhahn, KB2LSI; Bob Hopkins, WB2UDC; and your author. Various people brought in a wide variety of equipment for the kids to look at, listen to, and use, and handouts provided by the club and the ARRL, plus magazines provided by *CQ*.

Today I saw a program about radios. I learned that radios are used everywhere for every occasion. You could use them to contact help in an emergency like a fire, a tornado, or if someone gets hurt. You could also use radios in outer space to contact people on Earth.—Nigel Joseph, age 10

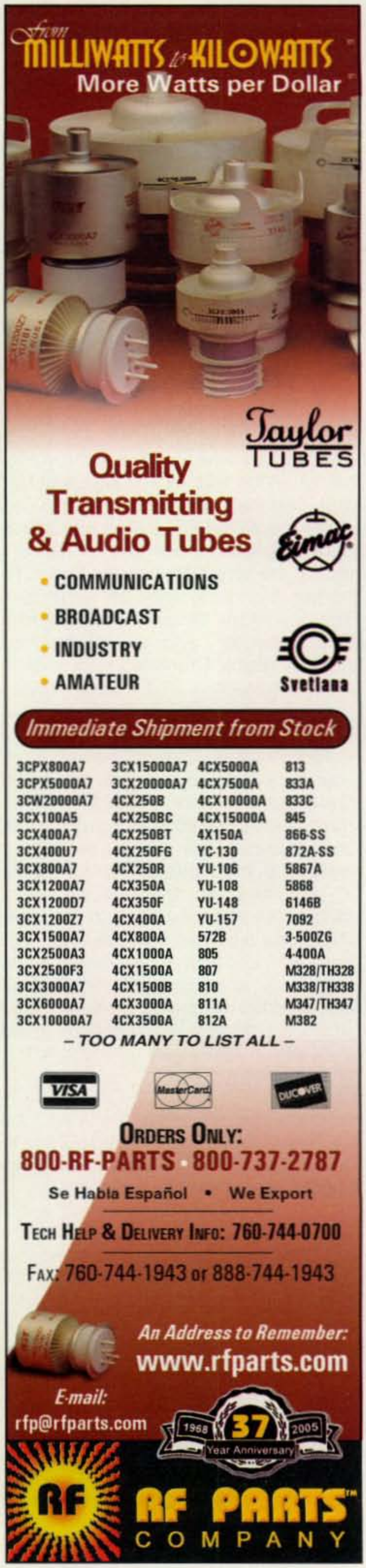
A few people brought in old "boat-anchor" receivers to give the kids a sense of how things have changed in a relatively short time—particularly when contrasted with the Elecraft K2 and K1 that W2LJ brought in and various VHF/UHF handhelds. In addition, there was an HF phone station and a PSK-31 station (*"you can do that without the internet!?!"*), plus WB2UDC brought in a laptop computer equipped with a program that produced Morse code from typed text. It was the hit of the program, as Bob and I listened and translated names and occasional other comments, such as
"- .... --- -.-. --- --- .-.." ("this is so cool").

This morning, I saw a program about radios. I learned that radios are used for emergencies (fire, tornados, hurri-

Take Our Daughters and Sons to Work Day

"Take Our Daughters and Sons to Work® Day" started out in 1993 as the "Take Our Daughters to Work" program, sponsored by the Ms. Foundation for Women and aimed at promoting equal opportunities for women in the workplace and addressing research that showed a drop in self-confidence among adolescent girls. In 2003, the program was expanded to include sons and refocused on promoting greater balance in work, home, and community life for both women and men, or, in the words of a foundation news release, "to begin a discussion between girls and boys and the adults in their lives about the competing challenges of work and family."

According to the Ms. Foundation, more than 10 million girls and six million boys were expected to participate this year, to "experience firsthand the connection between reading, writing, arithmetic, and the workplace." For more information, visit <http://www.daughtersandsonstowork.org/> or <http://www.ms.foundation.org/>.



canes, etc.). I also learned that there are radios in space. Radios are the best backup communication in the world. I also learned that radios use Morse code, which is reliable and easy to use. Anyone can learn to use ham radio.
— Matthew Trujillo, age 9

Radios are the best backup communication devices. Morse code is also reliable and easy, too. Morse code is only easy when you practice and listen to it. It's also hard to learn, so if you're interested, study hard!
— Nigel Joseph, age 10

A Three-Part Program

The program was split up into three segments. In the first, all 107 kids watched and listened as W2PQ introduced everyone. WB2UDC talked about how ham radio was responsible for his contacting the space shuttle and forming a lasting friendship with an astronaut. Then he made several contacts on a local repeater, and we played the ARRL's Walter Cronkite video on ham radio emergency and public service communications.

Today I learned that in Colorado there was a fire in the forest. It burned down the electricity wires. Then they made (ham) radios that you can talk on so that someone can hear you if they have a walkie-talkie. People can hear you within 100 miles. Anyone can use [ham] radios, but you may have to pay over $500 for a big radio. I also learned that boys are not the only ones who can be engineers. In addition, I learned about Morse code and was able to make words and names using the code. I had a lot of fun and I was very excited!—Ghilene Joseph, age 7

Next up was a video featuring ham educator Carole Perry, WB2MGP, talking about ways in which ham radio can help with education and careers.

Today at IEEE, I attended a presentation on amateur radio. I learned that ham radio ... can help you in math because you need to know different algebraic equations. I found learning about ham radios very interesting.
—Aimee Haasz, age 11

Today I learned about ham radios. Ham radios are used to contact people or emergency workers. Ham radio's actual name is amateur radio. The amateur radio's name does not mean it does not work very well. It actually works very well because someone in New Jersey could contact someone in Antarctica!

Bob Hopkins, WB2UDC, asks a question and seems to be getting a pretty good response. (Dan Moseson photo)

Also, my Uncle George is a ham radio operator. A ham radio today is shaped like a walkie-talkie. But back in the 1900s, ham radios were the size of stereos! Ham radios are used in space to send messages to the space station. Also, kids today are learning a lot about ham radios. That is what I learned about amateur radios.—Greg Nielsen, age 10

Then it was my turn, and I talked about the *fun* of being a ham and of being able to make contacts with Antarctica, as well as the chances you get as a ham to do things almost no one else can do, such as send signals up to a satellite or bounce signals off meteor trails (as my son, Dan, who was also there, puts it, "What other hobby lets you play with meteors!?") or the moon.

I learned today about signals and amateur radios. The amazing things I learned from amateur radios are that you can talk to anyone around the world and in the U.S. I also learned that the signals of the amateur radios can bounce off to the moon and get back into another radio around the world, so people can communicate.
—Esteban Beltran, age 11

I didn't know that anyone can pick up your signal even if you were in China. You would send off your signal and someone in the USA could get your sig-

CQ Editor Rich Moseson, W2VU, listens as one of the young people in the audience answers a question. (Dan Moseson photo)

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Take Your HT to Work Day

If you get this issue early enough, you might just have time to participate in "Take Your HT to Work Day" on Tuesday, June 21. This is an ARRL effort to encourage people to show off ham radio to co-workers by bringing in a handheld and putting it someplace where other people can see it, such as on your desk or on your belt, and hopefully ask questions. At lunch, hams are encouraged to show fellow employees how the radio works by getting on a local repeater and making some contacts ... then inviting co-workers to come visit them at Field Day the following weekend.

Participants are urged to send a report on "Take Your HT to Work Day" activity—including your callsign, the number of non-hams who watched you make a contact, the number of non-hams you were able to get to talk on your radio, and the number who said they'd come to your Field Day site—to: HT Workday, ARRL, 225 Main St., Newington, CT 06111.

nal. Also I didn't know that your signal could bounce off the MOON!!! "73" in Morse code stands for "bye."

— Zackry Grace, age 8

Next, we split up the kids into groups that took turns visiting various activity centers, including sending code on Bob's computer, listening to shortwave broadcast stations on an old Hammarlund receiver, making PSK-31 contacts, and making HF phone contacts.

At the program at IEEE this morning, I learned about ham radios. They can be used to communicate to different people all around the world! ... Over the years, the ham radio has been transformed into different shapes and sizes. Every day technology is changing and we are now able to put a lot more technology into smaller objects. The program was very useful on the subject of ham radios.—Amanda Haasz, age 14

Finally, we got everyone back together (the kids at the code computer wouldn't sit down until they'd all had their turn!) to wrap things up and hand out stuff to take home, including the new ICOM ham comic book (courtesy of ICOM and ARRL) and copies of *Popular Communications, CQ,* and *CQ VHF*, which I described respectively as "the listening magazine, the ham radio magazine and the more technical magazine." Maybe it was a function of talking to an audience made up mostly of engineers' children, but I was pleasantly surprised at how many of the older kids (14–16 range) asked for "the technical one."

I was also very impressed with how much they learned and how much fun they had. There were also a few lessons for the teachers here: We can't be too vague or general. Kids are very concrete, and to a kid, 100 years could just as well be a million years. Several noted that ham radio was "the oldest communication tool in the world, having lasted for over 100 years!" While ham radio has been around a while, spoken language, drums, and cave paintings all are slightly older communication tools. We need to be sure that we say what we mean and mean what we say. Plus, we need to be sure to speak clearly and explain things that aren't immediately obvious. For example, a few kids misheard "ham radio" as "hand radio," and since we were holding radios in our hands, that seemed to them to make a lot more sense.

Radical Action Cat

With thanks to W2PQ and WB2UDC for giving me the opportunity to join this great group, to the IEEE for sponsoring the event, and especially to the 100-plus kids who gave up a morning to discover a new/old way of communicating, I'll close with my favorite quote of the day, from 12-year-old Rachel Vogel:

Today I learned a lot of things. First of all, I learned about amateur radios and how they work. I discovered with a

"The Technical One"

After everyone came back from the activity centers, I took an extra few minutes to talk about how radio has become an essential part of our everyday lives, even though many people don't realize it. I explained to the kids that cell phones and cordless phones are really two-way radios, and that the wireless mic I was using and even infrared remote controls—such as the ones used in the rest rooms (that got their attention!)—all operate via radio waves.

Then, as noted in the main text, I was pleasantly surprised by the high level of technical interest shown by some of the older kids at the program, as evidenced by their asking for a copy of CQ VHF, *which I'd described as the more technical magazine of the three that we publish.*

Coincidentally, as we were preparing this issue, CQ *Antennas Editor Kent Britain, WA5VJB, forwarded to me some notes from his daughter, Tamara, KB5RYE, on ways of getting young people—particularly technically-oriented young people—interested in amateur radio. Tamara's comments brought together those two seemingly unrelated events, with the addition of the perspective of a young, female, technically-oriented ham.— W2VU*

From Science Fiction to Science Fact using HAM Radio

By Tamara Wilhite, KB5RYE
(e-mail: <tamarawilhite@hotmail.com>)

Amateur radio is losing appeal, in my view, because it has lost its connection to day-to-day life. Going out and showing kids how it can be fun and relevant to their lives can help bring the next generation into this hobby. Here are a few ideas:

• For budding astronomers, watch and listen to the *Perseid* meteor shower.

• For ET fans with "SETI@home" on their computers, set up an antenna and listen for signals.

• For future astronauts, do moonbounce or listen to the shuttle or International Space Station on a flyover.

• For physics buffs, explain how microwaves work—and demonstrate those principles with antennas.

• For car fanatics, explain how speed traps and radar work—and how to reduce their profile.

Bringing your PC into the QSO

A popular activity today among technically oriented young people is "distributed computing," or the use of multiple computers in different places to work on one large task. The most popular is "SETI@home." Here are some distributed computing sites in which hams might be interested, and which might help build interest in ham radio among distributed computing enthusiasts:

• SETI@home: <http://setiathome.ssl.berkeley.edu/>. Seti@home was the first and is still the largest distributed computing project. If an interest in radio astronomy brought you into amateur radio, this is a good way to bring your PC into the cause.

* ChessBrain: <http://www.chessbrain.net>. For those whose favorite computer game is chess, ChessBrain is a virtual chess supercomputer using the processing power of internet-connected machines.

For physics buffs:

• Muon1: <http://www.stephenbrooks.org/muon1/>. Here you can use your own PC's idle time to simulate and design parts of a particle accelerator.

• Einstein@Home: <http://Einstein.phys.uwm.edu/>. Grid computing trying to find gravitational waves.

• Golem@Home: <http://www.demo.cs.brandeis.edu/golem/>. Help design artificial life forms through this distributed networking project.

Drew Moore, W2OU, draws an excited crowd for making HF contacts during the "activity centers" segment of the program. (Photo by Rosemary Tennis, IEEE)

hand-held radio, you can talk to anyone around the world, and even in space! I also learned about the Morse code alphabet. My name in the Morse code is .-. .- -.-. .... . .-... That is pretty cool.

I also learned that if someone can't understand your name, for Rachel, I would say something like Radical Action Cat Hello Energy Llama. Also, if someone wanted to say goodbye, they would say 73. I am planning on learning a lot more things today. ■

Note

1. The IEEE is the world's largest professional association dedicated to the advancement of technology, with 365,000 members in 150 countries. Additional information is available at <http://www.ieee.org>.

The ham radio demo crew, who, as WB2UDC put it, took a day off from work, vacation, or retirement to put on the program. From left, Bob Hopkins, WB2UDC; Dan Moseson; CQ Editor Rich Moseson, W2VU; Victor Pennettak, KC2NBC; Drew Moore, W2OU; Jack Muhlhan, KB2LSI; Larry Makoski, W2LJ; and group leader Rich Pascale, W2PQ. (WB2UDC photo)

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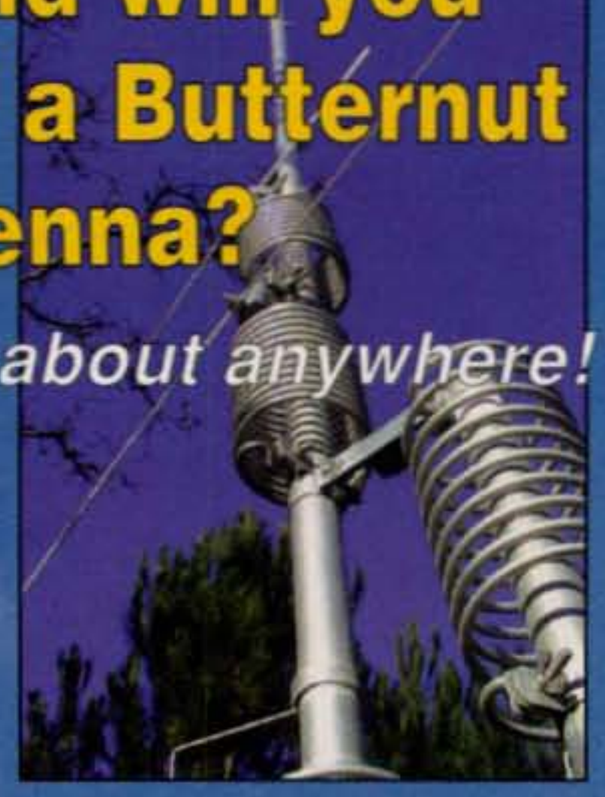

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Antennas ... big or small, short or tall, we hams love 'em. And we love to build 'em. Over a long ham career, WA8WTE has found cheap or free antenna-making materials in his local junkyard, home improvement store, and even the woods. His ideas here are intended to get your own creative juices flowing...

Antennas for Next to Nothing

BY GEORGE M. EWING,* WA8WTE

This article was prompted by the comments made by Taylor Mack, KD5ZJZ, and Kent Britain, WA5VJB, about cheap homebrew 6-meter antennas ("Our Readers Say," page 114), and also by Irwin Math, WA2NDM's comments about self-reliance and home-brewing ("Math's Notes," page 60), all in the January 2005 issue of *CQ*. I'm attempting to give anecdotal examples of antenna projects that have worked for me, especially in my early days as a student and beginning teacher, and some of my fellow hams over the years. Most of the time I was operating with a microscopically small budget in terms of cash, but in an environment rich in sources of scrounge materials, as well as valuable advice and technical help from older, more experienced amateurs.

Case #1: Cut It in the Woods

I got my Novice ticket and the callsign KN8ZSK when I was in high school. At that time I needed to support both ends of a half-wave dipole for 40 meters. A piece of scrounged TV mast clamped to the chimney was cool for the house end, but for the back yard I needed a mast. My dad helped me get a permit, free, from the Hiawatha National Forest. We took our time shopping for a mast while hunting and fishing, and eventually settled on a weather-resistant Tamarack about 35 feet tall, which we stripped, barked, and brought home on the roof of the family's 1959 Plymouth station wagon. I mounted it to a tool shed with a big lag bolt and washers. It was heavy, but I could raise or lower it in a minute or two. It worked great and lasted for years. There was no cost except time and sweat equity.

Case #2: Culture Shock and the Cardboard Technique

In 1967 I was a senior at Michigan State and had just gotten my Technician class license, which in those days was all VHF; no Novice or low-band privileges at all were included. The culture shock was this: As a licensed ham and full-time student, I had unlimited access to W8SH, a state-of-the-art university radio club station in the MSU Engineering Building. All of the equipment was top-of-the-line Collins gear, including quarter-kilowatt VHF transverters for one of the S-Lines, and I got the impression that Collins factory engineers flew in weekly from Iowa in Learjets to replace dial light bulbs, polish the knobs, and maybe recruit EE majors for jobs with the company after graduation. If the club wanted a new tower, a drawing would be given to the university and the following week there would be a new tower, with all the necessary engineering and building-code paperwork finished and filed in triplicate.

This was appliance operating in spades—beautiful, high-power gear and lots of DX and contest fanatics papering the

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wall with exotic QSLs and certificates. What the club station didn't have, as nice as it was, was anyplace for the tinkerer or experimenter. Not only was there no workshop or test bench, students actually were forbidden to bring tools into the shack!

At the other extreme of the economic spectrum, my cheap, rented off-campus room in East Lansing had no facilities at all. I wanted to get on the air from *home*, but I had no budget. Could it be done? Of course!

I traded a three-speed bicycle with squeaky brake pads for a friend's ancient Heathkit Sixer, halo antenna, and some small-diameter coax. Now all I needed was a 60-foot tower! Right. What I actually found was a dozen big cardboard mailing tubes in a church dumpster across the street, along with some plastic baling twine and a crusty half-bottle of Elmer's glue.

By the weekend I had a glued-up, stiff cardboard tube about 4 inches in diameter, a little under 30 feet long, and coated with discarded paint for waterproofing. My room was on the third floor of a four-story building, and I got permission from the student in the room upstairs to run string guys from his window sills. With the butt end of the tube clamped to my window sill and the whole thing tilting out against the guys at a slight angle from the wall, the halo antenna on the other end was about 8 to 10 feet above the roof and a respectable height, say 50 or 60 feet, above ground. I grounded the coax braid to a metal downspout and just disconnected the coax and left it outside the window during lightning storms.

Besides the Vietnam War and the Detroit riots, the summer of 1967 was noted for some monster openings on 6 meters, and there was still a lot of AM activity in those days. Despite a lowly rushbox receiver and QRP output, I made several dozen local contacts, often as much as a hundred miles out, and heard tons of DX, even managing to work quite a few. Copying CW on a super-regenerative rushbox is very difficult, and SSB was impossible, but I could *send* CW okay with the Sixer, and several West Coast and Caribbean AM stations had no trouble copying me on CW, even when my AM signal was down in the noise.

I went back to my old neighborhood a couple of years later to visit a former girlfriend on campus, and the mast was still there; some student had put a broadcast FM turnstile receiving antenna on it.

Case #3: Automotive Improv

I used the little halo, and also a matching smaller one for 2 meters, mobile for several years, but FM was booming, especially on 2 meters, and I needed cheap antennas with vertical polarization or I'd be at a 20-dB disadvantage compared to everyone else. I made dozens over the years, so here are just a couple of quick ideas: A telescoping car AM broadcast antenna, free or very cheap at a junkyard, can be set to a magic length, right around 54 to 56 inches; when it's done properly, you end up with a vertically polarized quarter-wave on 6 meters and also a three-quarter-wave on two. You find the exact length with a cheap CB SWR bridge and set for the best compromise for lowest reflected power on both bands. The exact setting will vary based on just where in the bands you're operating, the capacitance of the coax leads, etc. Performance on 2 meters was better than a 19-inch quarter-wave whip and was pretty decent on 6. I'd be cautious about running more than 20 watts or so, though, if you're using the stock Motorola-type car-radio coax and plug.

You can also make a 5/8-wavelength, 2-meter vertical this way, setting the telescoping sections at around 47 to 49 inches, but you'll have to add an impedance-matching stub or a tapped coil at the base. Another easy conversion is to clamp a shorting wire across the center loading coil of a roof mag-mount CB antenna and change the length of the top whip by trimming or mounting a new piece of longer wire. You can also leave the coil alone and just trim a small bit off the top whip, and then you will have a nice, easy 10-meter vertical. I recently worked Japan, Brazil, and Sri Lanka from the Tampa Airport with one of these and a little RadioShack 20-watt SSB rig on 10. The PY7 was running 100 watts into a quad; the other guys had low-power mobile rigs, too.

Case #4: The Champaign Hustler

I actually wrote an article on this one.[1] I replaced the missing lower mast of a Hustler™ mobile antenna setup with copper pipe, using soldered-on plumbing hardware and 3/8" × 24 nuts, bolts, and lockwashers. The new mast was copper instead of chrome-plated brass, only cost a few dollars, and was com-

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pletely compatible with stock Hustler resonators, springs, bumper mounts, and other hardware. It was not quite as mechanically rugged, but it was very easy to repair with a hacksaw and blowtorch in a minute or two if it got bent. I used it with an HF rig on a Thanksgiving holiday trip to Champaign, Illinois, hence the title. (I now had my General ticket.) It worked great, and I also built an 11-meter version called the "CopperHead," which I sold or traded to a number of CBer friends back in the Double Nickel, Smokey & the Bandit, madness of the 1970s.

Case #5: The Magic Stair Rail

I actually built a half dozen or more antennas over the years with the same piece of wood, a 24-foot piece of heavy 2 1/4-inch dowel rod, meant to be a stair railing. I picked it up at a lumberyard junk-bin sale for a few dollars. Using scrap pieces of #12 copper electrical wire and stand-offs meant for TV twin-lead, the first masterpiece was a 5-element "hairpin" vertical collinear for 2 meters, right out of the ARRL's *Antenna Handbook*. The middle element was center fed with a 4:1 coaxial balun. At first performance was poor, but then another ham helped me correct the balun for the oddball non-standard velocity factor of the scrounged cable TV coax I was using. With a loop length of nearly 30 inches, instead of the 26 in the *Handbook,* everything worked great. Later I added a 10-meter wire ground plane to the same dowel and put it up on the roof of W8JXA, a municipal radio club station in Sault, Michigan.

Case #6: Dumpster Copperweld™ and the Droopy Delta

Not every bit of antenna improvisation works perfectly. During my first year of teaching in the small town of St. Ignace, Michigan, I was living in a log cabin on a hilltop that was almost a perfect VHF location. The cabin came with a 40-foot TV tower, and I could climb to the top and actually look *down* at the 500-foot towers of the Mackinac Bridge. I had lots of funny adventures in my two years there, but there was one big one that didn't work out.

Somebody had scrapped a couple of miles of #12 copper-plated steel wire from a rural phone line at the township dump. Since it wasn't solid copper, it was worthless as scrap, and I could have all I wanted.

The first attempt at a big 6-meter antenna was a five-element delta-loop quad on a 24-foot boom. I nailed and glued the boom as a T-spar, splicing together pieces of 1" × 4" furring strip lumber about 8 feet long. The elements were stiff wire loops supported by 6-foot crosspieces of 1 × 4, with the lengths right out of the *Antenna Handbook*.

It worked, sort of, but it was mechanically very awkward. I swung the whole thing off the tower about 30 feet up, swinging-gate style, hanging from a nylon rope at the top and walking it around with a rope dangling from the director end to the ground. Two big problems arose: The swinging-gate arrangement only covered 120 degrees, and performance off the back was terrible. Also, it was horizontally polarized, and I couldn't see any easy way to move the feedpoint for vertical polarization for FM. I tried to work a 6-meter FM sked with WA8YNP in Houghton, Michigan a couple of hundred miles away. We each had old Kaar Engineering 100-watt rigs with surplus crystals hand-ground for 52.525 MHz, but we never connected, although we both heard other stations.

Final Thoughts

The key to low-budget antenna improvisation is thinking a little outside the box. An antenna is basically just a piece of conductive metal and some kind of mechanical support to keep it in place. Over the years, many Field Day stories have shown how you can improvise antennas with old aluminum extension ladders, storm doors, second-hand copper pipe, Slinky™ toys, and even tinfoil wrapped around plastic pipe or cardboard. Hams have a long tradition of ingenuity, going back to the days of Marconi's kite. Keep safety in mind, but be creative! ■

Additional Ideas from WA8WTE

1. "Mobile Antenna Ingenuity," *73 Magazine,* March 1978.
2. "I Am Curious, Infrared" *CQ,* May 1977
3. "Sheathe Thyself!" *73 Magazine,* August 1980.
4. "Blow Up Your Heathkit!" *CQ,* October 1980.
5. "The Ten Meter Lunch Hour,"*73 Magazine,* November 1981.
6. "They Threw WHAT Away?" *73 Magazine,* May 1986.

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T-4-500	35k @ 3.5 MHz, 75k @ 14 MHz 500 W	$33.95

Check our web site for comparison with other brands. You wont believe the difference. The others don't even come close to this level of isolation.
Ferrite Cores, snap-on, 1-250 MHz 1/4 i.d. $2.50 or 1/2" i.d. $4.50

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PL-259ST	Silver-Teflon, U.S.A.	$1.49 or $25 pk of 20
PL-259GT	Gold-Teflon, U.S.A.	$1.79 or $33 pk of 20
N-200	'N' Silver-Teflon, installs like a PL-259	$3.99

Coax & cable prices are per foot <100'/>100'

ExtraFlex 9096IIA	flexible 9913 type, low loss	67¢/63¢
RG-213 Plus	Enhanced, 96%+super quality jacket	49¢/43¢
Super RG-8X	1.5 kW @30 MHz, low loss, double shield	35¢/31¢

RG-8X JUMPERS - PL-259 on each end. Factory made, molded strain relief, top quality coax. 18" double shield - $6.25
18" single shield - $5.50 3' - $6.25 3' double shield - $7
6' - $7 6' double shield - $8 9' - $7.50 100' - $23.95

R1 Rotator	8 conductor (2 x #18, 6 x #24) 50' multiples	24¢
R2 Rotator	conductor (2 x #16, 6 x #18) 50' multiples	39¢
#14 HD	Stranded, 7-conductor hard-drawn	9¢
#14 FlexWeave	168-strand, bare, for any wire ant.	20¢
#12 FlexWeave	259-strand, excellent for long runs	22¢
450 Ladder Line	#16 stranded conductors, poly, 420 Ω	31¢/25¢
450 Ladder Line	#14 stranded conductors, poly, 390 Ω	36¢/31¢

Tinned-copper braid, for grounding, 1/2" @ 65¢/ft or 1" @ $1.19/ft
LadderLoc Center insulator for ladder-line $13.50
Weatherproofing Coax Seal, $2.75 STUF, $6 Cold shrink, $7
Pulleys - for antenna support rope. Highest quality, small, lightweight, sailboat type for fibrous rope - for 3/16" rope $14.95 or 5/16" rope $16.95
Antenna Support Line BLACK Dacron, single braid, fungus and sun resistant 3/16" 750# test $10 per 100' $83 - 1000' spool
Kevlar-no stretch .075" dia. 500# test, Dacron jacket 200' spl $18.50
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Results of the 2005 CQ WPX RTTY Contest

BY GLENN VINSON,* W6OTC, AND JOE WITTMER,† K9SZ

The 11th annual CQ WPX RTTY Contest was held February 12–13, 2005. Not only was a record number of logs submitted—1,342, twice as many as in 2002—but record scores were achieved in many categories. Virtually all logs were submitted via e-mail, and the accuracy of most logs was very good. The increased participation, plus good operators and good contest stations, keeps pushing scores upward. Average scores in virtually all categories (the exception being 10 meters) increased compared to 2004: just compare the results in the Top Scores box this year with those in the box last year.

February propagation is quite different from September propagation when CQ WW RTTY is run, and the premium on low-band contacts in CQ WPX RTTY accentuates those differences. The time restrictions for single operators also require a different strategy success WPX compared to WW. The results suggest that contestants in all categories have a firm grasp of these differences and know how to maximize their performance.

Unlike last year when Paolo, I2UIY at P40G, demolished the competition in all classes, the highest scores in this contest were achieved, as one would normally expect, in the Multi-Op categories, with new world records set in Multi-Single and Multi-Multi classes. But new world records were also set for single ops on 80, 40, and 20 meters; new U.S. records were set in Single Op High Power, Multi-Multi, Single Op 80 meters, Single Op 20 meters, and Single Op 15 meters; and new Europe records were set in Single Op High Power.

Geomagnetic conditions were mediocre worldwide throughout the contest, with no solar storms, and with the solar flux level being similar to 2004, averaging around 108. Judging by the scores submitted, the slowly declining flux level continues to be more than overcome by the yearly increase in RTTY contesting activity.

The Multi-Single crew at 6G1KK (left to right): N5KO, W6OTC, XE1KK, and XE1NK.

Single Operator

Single Operator, Low Power (SOL). In SOL, 673 (up from 503 in 2004) participants submitted logs, about one-half of the contest total. As the results demonstrate, only a few points separated many entrants. Wanderley, ZX2B (op: PY2MNL), the 2002 and 2004 winner, repeated his feat this year with a score of 3,342,741 points (1,726 Qs, 5,637 pts, 593 mults), another new record for Brazil. The Africa SOL record fell again for the third year in a row, this year, as in 2004, to Mohamed, CN8KD, who scored 2,543,500 points (1,322 Qs, 5,087 pts, 500 mults). Moving up from world fifth place last year, OO4ADZ (op: ON4ADZ), won world third place and beat his own Europe record with 2,369,115 points (1,377 Qs, 4,347 pts, 545 mults). World fourth place, F6IRF, also broke the former Europe record, while A45WD (op: YO9HP) set a new Asia record with 1,997,562 points.

Single Operator, High Power (SOH). Participation in SOH increased to 263 entrants (up from 195 in 2004). SOH competition is always tough, and this year YL2GM, operating from Trinidad and Tobago as 9Y4W, won the competition with 4,965,240 points (2,026 Qs, 7,710 pts, 644 mults). Again, a location such as P4, just offshore South America, proved to be unbeatable because of its ability to run both U.S. and Europe stations on 40 and 80 meters and get the valuable 6-point multipliers. In second place was 9A5W, scoring 3,701,221 points (1,723 Qs, 6,179 pts, 599 mults), a new Europe record. Close behind, world third this year came from New England, as Rick, KI1G, scored 3,265,632 points (1,711 Qs, 5,336 pts, 612 mults), setting new North America and USA records.

Single Operator, Single Band 28 MHz (28). As noted in past years, RTTY operators do not seem to operate frequently on 10 meters except during solar flux peaks and during contests. Then the band magically opens with lots of activity, particularly on the north-south paths. As in 2004, Argentina and Brazil dominated in top scores, with John, LU1HN, winning again, scoring 1,601,860 points with 1,070 Qs, a much larger number for a 10-meter-only entry than in CQ WW in September. PY2OMS (op: PY5EG) was world second with 594,762 points, while LU5FII was world third with 462,080 points.

Single Operator, Single Band 21 MHz (21). Continuing last year's trend, an Argentina station won the top spot on 15 meters, and set a new SO21 South America record. This was LU7HN, who made 1,589,787 points (1,048 Qs, 3,099 pts, 513 mults). In second place was S51FB, scoring 1,213,236 points, while IV3HAX was wWorld third at 1,072,929 points. Close behind, K4EA set a new USA record for SO21 with a score of 1,030,500.

Single Operator, Single Band 14 MHz (14). The competition on 20 meters produced a new world record, this time from Europe, with LY3BH making 1,102,524 points, beating the old SO14 world record set by 9A7R, who decided to move down to 80 meters this year. World second was PY2NY, who scored 945,216 points, while Tapani, OH2LU, was third with 749,034 points.

Single Operator, Single Band 7 MHz (7). After waiting for six years, the SO7 world record was finally smashed this year, but with an entirely new cast of characters. The new world champion is Marco, I4IKW, who scored 2,577,060 points (1,031 Qs, 5,004 pts, 515 mults), more than one-million points higher than ED8WPX's world record set in 1999. World second was SN7Q, who also broke the old world record with his score of 2,044,250 points. HA7UG almost broke the old world record with his world third score of 1,529,488 points.

Single Operator, Single Band 3.5 MHz (3.5). Like last year, the 80-meter competition was just as intense as that on 40 meters. Three-time winner and former world record holder, Tone, S54E,

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†e-mail: <k9sz@wittmer.us>

Juris, YL2GM, at 9Y4W, world champion, Single Op High Power.

reasserted his leadership this year with a big win and new world record of 1,545,740 points (799 Qs, 3,620 pts, 427 mults). In world second place was OL1RY (op: OK1DF), who also broke the former World Record with a score of 1,256,976 points. World third was 20-meter veteran 9A7R, who joined in the 80-meter action this year with 1,052,688 points. World fourth was UY6F (op: UXØFF) with 1,007,084 points, while NB1B set a new USA SO3.5 record with 967,840 points, more than enough to win the world prior to 2004.

Multi-Operator

Multi-Operator Multi-Transmitter (MOM). Whenever a new world record is set in MOM class, one can be sure that much hard work and preparation was involved. This year the reigning world champion, LY5A, with a tight team of only five operators (LY2PAJ, LY2IJ, LY2BIG, LY2KW, LY2TA), set another world record with a score of 8,881,740 points (3,394 Qs, 11,130 pts, 798 mults). World second was last year's winner, the RKØAXX mega-team (RAØAM, RA0AHC, RAØALM, RUØAM, RUØAE, RVØAR, RUØAT, RUØAKA, RVØAEV, RVØAX, RWØAR, RXØAE, RZØAT, Wladimir), whose scored soared from 4,912,355 points last year to 6,784,894 this year. World third was the team at G6PZ, which had only three operators (UT5UDX, UT7UJ, UT3UA) but scored 6,013,120 points. World fourth, again breaking its own NA and USA records, was the Woodbridge Wireless group at KA4RRU (KA4RRU, N4DXS, WA4TK, W4DC, K3UI, KG4HTL, KD6AKC, K4RG, Lianna, Tessa), scoring 3,911,680 points.

Multi-Operator Single Transmitter (MOS). This class continues to attract more entrants than all the other multi-operator classes combined despite the fact that unlike CQ WW it allows only one transmitter to be used by all operators, and there are no power classes. This year the winners were in Asia and Europe, but unlike last year a new world record was set. The new world champion is RL3A (ops: RL3FT, RV3BA, RX3DCX, UA3ASZ), who achieved 6,537,180 points. Repeating as world second was HG1S (HA1TJ, HA1DAI, HA1DAC, HA3UU, HA1SN, HA1AR, HA1AV, HA1AH, HA1SD, HA1DAE), very substantially increasing its score from 3,345,346 points in 2004 to 5,606,512 points. Moving back to Asia, UA9AYA (ops: UA9BA, RW9CF, RW9MG/9, UA9CDV, UA9CGA) won world third with 5,547,324 points.

Multi-Operator Two Transmitter (M2). This year the M2 Class continued to produce very large scores, perhaps because many entrants are veteran contesters in all modes. The world winner was LX8M (ops: LX1RQ, LX1ER, DF7ZS, DL1ZBO, DF4OR) with 7,645,980 points, a new Europe M2 record. Close behind in world second was YT635A (ops: YT635A, S56A, S57NDT, S57IIO, YU6ESC), scoring 7,264,414 points. World third, establishing a new Oceania record for M2, was KH6YY (ops: AH6OZ, KH6ND, KH6YY, KH7U, WH7N) with a very impressive score of 7,017,472 points from the middle of the Pacific Ocean. Last year's world second, Z37M (ops: Z31MM, Z32ID, Z32PT, Z32XA, Z36W), substantially increased its 2004 score of 4,577,092 points to 6,522,895 this year, a great achievement.

Rookie of the Year

Sixteen operators entered as Rookies this year and their scores were substantially higher than last year. The world winner was ABØLR, who entered in SOL and made 674,475 points. In world second place was KB1JZU, also SOL, who scored 594,660 points. Close behind in world third was YU1CQ (SOL) who scored 553,269 points.

SWL

The SWL winner this year was ONL383, who logged many more Qs than his competition: 781 for 1,046,430 points.

2005 PLAQUE SPONSORS AND WINNERS

Single Operator High Power

World: Sponsored by John Orton, WA6BOB. Winner: **9Y4W (op: Yuris Petersons, YL2GM)**
N.A.: Sponsored by Charles Anderson, KK5OQ. Winner: **Rick Davenport, KI1G**
USA: Sponsored by Glenn Vinson, W6OTC. Winner: **Mike Sims, K4GMH**
Japan: Sponsored by The NN6NN RTTY Team. Winner: **Masaki Okano, JH4UYB**
Canada: Sponsored by Trey Garlough, N5KO. Winner: **Scott Nichols, VE1OP**

Single Operator Low Power

World: Sponsored by Bryan Preas, AC6JT. Winner: **ZX2B (op: Wanderley Ferreira Gomes, PY2MNL)**
N.A.: Sponsored by Steve Merchant, K6AW. Winner: **Don Hill, AA5AU**
Asia: Sponsored by Trey Garlough, N5KO. Winner: **A45WD (op: Alex Panoiu, YO9HP)**
Japan: Sponsored by The NN6NN RTTY Team. Winner: **Taisuke Kishi, JA1OVD**
Africa: Sponsored by Dirk Desloovere, ON4ADZ. Winner: **Mohamed Kharbouche, CN8KD**
Europe: Sponsored by Joe Wittmer, K9SZ. Winner: **Dirk Desloovere, ON4ADZ**
Canada: Sponsored by Scott Nichols, VE1OP. Winner: **Andy McLellan, VE9DX**

Multi-Op Single Transmitter

World: Sponsored by Doug Faunt, N6TQS. Winner: **RL3A (ops: RL3FT, RV3BA, RX3DCX, UA3ASZ)**
NA: Sponsored by Steve Merchant, K6AW: **6G1KK (ops: XE1KK, XE1NK, N5KO, W6OTC)**

Multi-Op Multi-Transmitter

World: Sponsored by Steve (Sid) Caesar, NH7C. Winner: **LY5A (ops: LY2PAJ, LY2IJ, LY2BIG, LY2KW, LY2TA)**

Multi-Op Two Transmitter

World: Sponsored by The HC8N RTTY Team. Winner: **LX8M (ops: LX1RQ, LX1ER, DF7ZS, DL1ZBO, DF4OR)**

Single Band

World, 14 MHz: Sponsored by Neal Campbell, K3NC. Winner: **Aleksandras Duchavicius, LY3BH**
World, 7 MHz: Sponsored by Frank McGonical, W6DSQ. Winner: **Marco Venturi, I4IKW**
World, 3.5 MHz: Sponsored by CQ Magazine. Winner: **Tone Crv, S54E**

The antenna farm at WØETC. The three-high TH7 stack on the front tower was Larry's weapon for Single Op 14 MHz this time.

Multi-Single NN6NN in action. Left to right: NR6N, N6DE, and W6XK.

Jose, YT6BTF, a big RTTY signal from Venezuela.

Summary

CQ WPX RTTY has now moved into first place for logs submitted, ahead (for the moment) of CQ WW RTTY. Both continue to be the only RTTY contests with more than 1,000 entrants, let alone more than 1,200 or 1,300. Interestingly, more than half of the logs are now submitted within the first week after the contest is run, and more than 80% within the first two weeks. As participation continues to grow annually, new world records are set regularly. As noted before, in both RTTY WW and WPX the master call files created for each contest are split about one-third U.S. calls and two-thirds non-U.S. calls. Strong International participation is clearly a significant factor in increasing scores.

To check all-time CQ WPX RTTY Records, look at <www.rttycontesting.com/records/cqwpxrtty.html hosted by Don, AA5AU and maintained by Joe, K9SZ. For a list of the ops in the 2005 WPX RTTY and the QRM go to: <www.cq-amateur-radio.com>.

We continue to progress with the electronic submission of logs, with approximately 99.9% of all logs (and 100% of competitive logs) submitted via e-mail to <wpxrtty@kkn.net>. Thanks to all of you who reviewed your logs carefully before submitting them. We received a large number of checklogs, which were very helpful for log-checking. Thanks to all who submitted these logs.

The 2006 CQ WPX RTTY Contest

The 12fth Annual CQ WPX RTTY Contest will be run on February 11–12, 2006 (the second full weekend of February). Please note that Cabrillo-format logs are highly encouraged for all entrants, with e-logs required from all potential high-scoring entrants in any category. Also, any computer-generated log with more than 100 contacts must be submitted via e-mail or on a 3.5" diskette via snail mail.

For those who submit diskettes, please remember to send the diskettes in a protective envelope. E-mail is clearly the most reliable and easiest mode for log submissions, but we welcome all logs, including (subject to the restrictions described above) paper logs, no matter how they may be sent. Finally, the deadline for log submissions is March 10, 2006. The full text of the 2006 rules will be published in the January 2006 issue of *CQ* and, on the CQ website at <www.cq-amateur-radio.com>. Please read the rules carefully prior to the contest, and please note that all logs submitted via e-mail go to <wpxrtty@kkn.net>.

73, Glenn, W6OTC, and Joe, K9SZ

(Continued on page 108)

Important On-Line Resources

To prepare for the 2006 contest, please refer to the following on-line resources:
Contest rules: www.cq-amateur-radio.com
Contest records: www.rttyjournal.com/records/wpx.html
Cabrillo specifications: www.kkn.net/~trey/cabrillo/spec.html
Cabrillo template for this contest:
www.kkn.net/~trey/cabrillo/wpx-rtty.txt
Log Submissions: wpxrtty@kkn.net

Eight New Products This Year, And More to Come!

While the Year is Just Half Over, LDG Electronics has Already Introduced More New Products than Most Manufacturers Release All Year!

It has already been a busy year at LDG Electronics. To start the year we released the AT-200Pro automatic tuner, our first auto tuner designed for today's high power transceivers. Then you saw the release of the TW-1, LDG's first SWR/wattmeter – a *talking* wattmeter – that appeals to the sight impaired, the "bi-focal" generation, and hams interested in the novelty of having a talking wattmeter. **Coming soon is the TW-2 talking SWR/wattmeter for VHF and UHF!**

We recently released the DTS line of antenna switches. These innovative antenna switches feature automatic grounding when you shut down and are able to handle up to 1500 watts. The DTS line also includes an optional remote control, allowing you to keep your desk clean, with only a small remote necessary to switch antennas.

The next product in our pipeline is the Z-11Pro, the long awaited follow-up to the legendary Z-11. The Z-11Pro is everything you've always wanted in a small, portable tuner designed from the ground up for battery operation.

Another Innovation This Year: Two-year Warranty on All LDG Products

Every product we sell now comes with a 2-year warranty. So when we say that our products are thoroughly tested, we have high levels of quality control, and we over-engineer our products to make them last longer – you will know that we mean it.

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The Return of a Legend! The Z-11Pro

Combining features and value, the light weight Z-11Pro is only 5" x 7.7" x 1.5". It handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 – 6 meters. The Z-11Pro uses LDG's state-of-the-art processor-controlled switched-L tuning network. It will match dipoles, verticals, inverted-Vs or virtually any coax-fed antenna. The Z-11Pro has 8,000 memories in LDG's exclusive "3D Memory" array.

List price $179.

Free interface cable for Icom or Yaesu radios with Z-11Pro purchase. Please visit our Web site for more information.

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New! The DTS-Series Antenna Switches

Tired of that tangled mess of coax and pigtails in your shack? Always worrying about whether you set the ground switch on your antenna before you left your shack? LDG's new DTS-4 antenna switch is for you. Instantly switch your rig between 4 antennas with the press of a button! Features automatic grounding when you shut your rig down. Purchase the optional DTS-4R remote control and put the DTS-4 anywhere indoors and operate it from your desk. The DTS-4 handles up to 1500 watts of RF power on HF (250W on 6M), and can be used with any coax-fed antenna.

List Price DTS-4 $79, DTS-4R $39.

NEW! The "Talking" SWR/Wattmeter

The TW-1 Talking 2 kW SWR/Wattmeter provides an aural spoken indication of power and SWR using a digitally recorded voice. It is ideal for the vision impaired, for those of us in the "bi-focal set", or just for those times when you need to be looking somewhere else. At the press of a button, the TW-1 speaks the forward power, reverse power or SWR. Three languages are selectable: English, Spanish and German. It includes its own internal speaker; no external audio hookups are needed. Available soon: the TW-2 UHF/VHF.

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Announcing:

The 2005 CQ WW RTTY DX Contest

September 24–25, 2005
Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday
Logs are due no later than October 28, 2005
Send logs to: <rtty@cqww.com>

I. Period of Operation: All stations may operate the entire 48-hour contest period.

II. Objective: The object of the contest is for amateurs around the world using RTTY to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 3.5, 7, 14, 21, and 28 MHz bands may be used. No 1.8 MHz or WARC bands.

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high power categories must not exceed 1500 watts total output power on any band. Only the entrant's callsign may be used to aid the entrant's score. No self-spotting on any form of DX spotting nets is permitted for any category. Self-spotting includes, but is not limited to, generating packet spots for your contest callsign by (a) using your own callsign; (b) using another callsign; or (c) other stations as a result of prearranged solicitation by you

V. Categories:

1. Single Operator (Single Band and All Band)

(a) Single Operator stations are those at which one person performs all of the operating, logging, and, for the Assisted category only, spotting functions. Only one transmitted signal is allowed at any time.

(b) Low Power: Same as V.1.(a) except that (i) output power is 150 watts or less and (ii) only All Band entrants may enter the Low Power category. Stations in this category compete only with other low power stations.

(c) Assisted (all band operation only): Same as V.1.a. except the passive use of DX spotting nets is allowed (see IV above). No power subcategories.

(d) Single Band: All contacts are made on one band, regardless of power level. However, entrants may make contacts on other bands for the benefit of other contestants if they submit logs in Cabrillo format and clearly mark in the log header which band is to be counted as the single-band entry (see Rule XII below). No power subcategories.

2. Multi-Operator (All band operation only)

(a) Single-Transmitter: Only one transmitted signal at any time. Limited to six band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the six-band-change rule will result in reclassification to the Multi-Multi category. Two power categories: Low Power (150W or less) and High Power (greater than 150W).

Exception: One and only one other band may be used during the same time period if and only if the station worked is a new multiplier. Violation of the six-band-change rule by either transmitter will result in reclassification of the entry to the Multi-Multi category.

(b) Two-Transmitter: A maximum of two transmitted signals are allowed as long as each signal is transmitted on a different band. Entrants in this category are allowed a total of six band-changes per transmitter in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the six-band-change rule may result in reclassification of the entry to the Multi-Multi category. No power subcategories.

(c) Multi-Transmitter: No limit to the number of transmitters, but only one signal and "running station" allowed per band. No power subcategories.

VI. Modes: Baudot only. No unattended operation or contacts through gateways or digipeaters permitted.

VII. Exchange: Stations operating within the 48 continental United States and the 14 Canadian areas transmit RS(T) report plus State or Area (Canada only) plus CQ Zone. All other stations transmit RS(T) and CQ Zone.

Valid Contacts: A given station may be contacted only once per band. Additional contacts are allowed with the same station on each of the other bands used in the contest.

VIII. Identification of Transmitters: Multi-Single and Multi-Two log entries must identify which transmitter made each QSO in the log (column 81 of Cabrillo QSO template for *CQ* contests). Multi-Multi entries which submit logs in other than Cabrillo format must provide a separate log for each transmitter.

IX. QSO Points: One QSO point for contacts within your own country. Two QSO points for contacts outside your own country but within your own continent. Three QSO points for contacts outside your own continent

X. Multipliers: One multiplier point for each U.S. state (48) and each Canadian area (14) on each band. Please use only official U.S. Postal Service abbreviations to identify states (e.g., Michigan = MI; Massachusetts = MA, Ohio = OH). One multiplier point for each DX country in the ARRL and/or WAE country lists on each band. *Note:* KL7 and KH6 are counted as country multipliers only and not as state multipliers. One multiplier point for each CQ zone worked on each band. Maximum of 40 Zones per band.

Canadian areas (14 total) are as follows: NB (VE1, 9), NS (VE1), QC (VE2), ON (VE3), MB (VE4), SK (VE5), AB (VE6), BC (VE7), NWT (VE8), NF (VO1), LB (VO2), NU (VYØ), YT (VY1), PEI (VY2).

XI. Scoring: Final score = total QSO points × the total multipliers (US states + VE areas + ARRL/WAE countries + CQ zones).

XII. Awards: First-place certificates will be awarded in each category listed under Section V in every participating country and in each call area of the United States, Canada, Australia,

and Japan. All scores will be published. To be eligible for an award a Single Operator station must operate at least 12 hours. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. (Single band entrants who also operate on other bands are encouraged to submit their logs to aid in the log-checking process. *Note:* Logs containing more than one band will be judged as all-band entries unless they are submitted in Cabrillo format and the single band entry is specified in the Cabrillo header.) All certificates and plaques will be issued to the licensee of the station used. To the extent sponsors or winners purchase plaques through the Contest Director, plaques will be awarded in the following geographical areas for each of the categories listed in Rule V: World, North America, USA, Canada, South America, Africa, Europe, Asia, and Oceania.

XIII. Instructions for Preparation of Logs: All logs should be submitted in Cabrillo format via e-mail to <rtty@cqww.com>.

1. Logs must be submitted no later than **October 28, 2005.**

2. Electronic Submissions.

(a) In the "Subject:" line of your e-mail message please include your callsign and the category you entered—e.g., SOABL, M2, MS, etc. Logs should be sent as an e-mail attachment, not in the text of the e-mail, and the **filename** for the log should be ***yourcall.log.***

(b) Entries from **Multi-Single, Multi-Two,** and **Multi-Multi** stations must be merged into a single chronological log that **clearly** indicates which transmitter made each QSO (column 81 of Cabrillo QSO template for *CQ* contests).

(c) If the Cabrillo format is unavailable, contact the log checker, Joe Wittmer, K9SZ, at <k9sz@wittmer.us>.

Other questions pertaining to the CQ WW RTTY Contest may be sent to the Contest Director, Glenn Vinson, W6OTC, 488 Locust St. – #401, San Francisco, CA 94118 USA, e-mail: <w6otc@garlic.com>.

XIV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is deemed by the CQ WW RTTY Contest Committee to contain a large number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he will be ineligible for any *CQ* contest awards for three years.

XV. Deadline: All entries must be e-mailed NO LATER than **October 28, 2005.** Logs received after the deadline may be listed in the results but will be ineligible for any award.

TECH TALK

If you can't hear 'em, you can't work 'em!

Whether DXing from the home QTH, operating portable or communicating while mobile, the classic expression of "If you can't hear 'em, you can't work 'em" always reigns supreme. That philosophy was also a special design consideration in Icom's development of the incredibly popular IC-706MKIIG transceiver. In particular, Icom focused on three interrelated areas: receiver sensitivity, selectivity, and noise reduction. This Tech Talk overviews those areas.

SENSITIVITY. The first and foremost requirement for top-notch receiver performance is high "front end" sensitivity with a low noise floor and wide dynamic range. Realizing that fact, the IC-706MKIIG's most important first mixer stage employs double balanced inputs and outputs for both weak signal amplification and common mode reduction of extraneous noise. The design concept here is simple but most effective: boost signals more than noise and you can hear what others miss!

IC-706MKIIG

Since signal levels vary from day-to-day and band-to-band, the IC-706MKIIG's panel-selectable receive preamp and attenuator also let you step up or reduce front end gain to fit needs at the particular time. This overall combination yields the unique ability to "pull weak stations out of the mud" and it is amazing! Even with a dual balanced first mixer and panel-selectable RF preamp and attenuator, weaker signals can still become masked by external noises. That is no problem for an IC-706MKIIG however. The transceiver's built-in noise blanker stops intermittent/pulse-type noise while its built-in DSP system reduces constant/band-type noise to noticeably improve copy under all conditions.

SELECTIVITY. Equally important for copying signals of all types and levels is sharp IF filtering. Icom's IC-706MKIIG really stands tall here, as its standard/included SSB filter is wide enough to yield full-bodied audio yet steep-skirted enough to cut QRM like a knife. Lacking such steep-skirted selectivity, strong signals can "blast through" or appear to widen a filter's bandwidth, and reducing receiver sensitivity is necessary to avoid that scenario. Comparatively, the standard/included SSB filter in '706MKIIG exhibits a better average signal or –6dB to strong signal or –60dB shaping factor than optional "SSB Narrow" filters from some other manufacturers. Surprising? Not really. Icom always delivers top performance in amateur radio gear!

HEARING IS BELIEVING! Thinking about a new transceiver for home, portable or mobile use? Great idea! Before selecting a particular rig however, remember to compare vital specs. Notice the IC-706MKIIG is first class in sensitivity (0.15µV in the 1.8 to 30MHz range) and selectivity (2.4kHz at the –6dB level, widening to only 4.8 kHz at the strong signal/-60dB level). Factor in initial cost or investment, years of enjoyable use, and later resale/trade value and you will agree that the IC-706MKIIG is today's best buy in an ultra compact transceiver!

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When is it time to replace that NiCd pack? Which brand of alkaline battery is the better buy? N2IRZ says West Mountain Radio's new Computerized Battery Analyzer II can help you answer those questions and more.

CQ Reviews:

The West Mountain Radio Computerized Battery Analyzer II

BY DON ROTOLO,* N2IRZ

Photo A– The West Mountain Radio Computerized Battery Analyzer II. One side connects to your computer's USB port, the other side to the battery under test. The massive heat sink and fan keep the unit from overheating, although it does get warm when testing at high power.

Is that battery any good? Are you sure? Can you prove it? I can. I have a West Mountain Radio Computerized Battery Analyzer II, and it tells me everything I need to know about my batteries.

With the ubiquity of batteries, both primary (non-rechargeable) and secondary (rechargeable), comes the question: Is the battery any good? That question usually refers to secondary batteries and their ability to take a charge and deliver that energy back to a load. Rechargeable batteries do wear out and fail, but the first inkling we have of that failure—which often manifests itself suddenly—is that the device being powered does not function, even though the batteries have a fresh charge.

For primary batteries, we concern ourselves with the amount of energy that can be delivered before the battery must be discarded and replaced. While any new set of D cells will power a flashlight for a while, two questions arise: Just how long is a while, and will one brand of battery last longer than another? We see the advertisements, but our experience tells us that particularly for mass-marketed items, the quality of the ads often have little to do with the quality of the product.

Enter West Mountain Radio's Computerized Battery Analyzer, or CBA. This compact and robust device (photo A) measures the actual capacity of a battery, allowing us to compare the performance of almost any kind of battery you might have to some standard or requirement. It's almost completely automated, so you don't have to be an electrical engineer to fully characterize your batteries.

Fig. 1 shows the results of testing three popular brands of alkaline D cell batteries. The brand names have been grayed out to protect the innocent, since this was not exactly a scientific test. What is important to note is that Brand B delivered 27% more amp-hours than Brand A, and yet they both cost the same. Which battery would you buy? With the CBA, the answer is obvious.

*P.O. Box 114, Park Ridge, NJ 07656
e-mail: <n2irz@cq-amateur-radio.com>

Battery Basics

Before we get into operation and performance, here's just a brief tutorial on batteries. All batteries are rated by their manufacturers according to the amount of electrical current they can deliver over a period of time, in units of amp-hours, along with standard characteristics such as the voltage, physical size, maximum discharge current, and chemical family to which they belong. Non-rechargeable batteries deliver a lot more energy for a given size than rechargeables, and different battery chemistries have different capacities and voltages.

For a battery rated at 10 amp-hours (Ah), you should *not* expect it to source 10 amps for an hour. These ratings are

always determined at a specific discharge time; smaller batteries are usually 10 hours and larger ones (such as car batteries) at 20 hours—until the voltage drops to some specified value. A shorter discharge time (higher current) will ultimately yield less energy, while a longer time (lower current) will yield more. It is important to understand the manufacturer's ratings and the underlying test parameters, since they can be misleading if different parameters were used.

West Mountain's CBA

Okay, now to the CBA. Operation couldn't be easier: Load the software, connect the CBA to your computer's USB port, attach the freshly charged victim . . . ahh, battery . . . to be tested, and connect the optional temperature probe. Tell the software the battery chemistry and it automatically selects the testing parameters. You can manually adjust these parameters (more on that in a moment), but the defaults are generally fine for a quick check or comparison of many batteries.

Click on the START button and the test begins. A self-scaling graph appears, showing the output voltage of the battery as a function of time, with the lower scale calibrated in amp-hours. Once the battery voltage falls below the cut-off voltage, the test concludes and the results are displayed (note that the analyzer runs the battery through a discharge cycle, so it will need to be recharged once the test is complete). The results can be saved, printed, or overlaid upon previous or future test results for a direct comparison, as well as exported as text or a .CSV file to a spreadsheet program such as Microsoft Excel® for additional manipulation. One particularly handy feature allows you to print out labels for attaching to a battery or battery pack so you can tell its actual performance and rating at a glance and be able to spot any declines in performance in the future.

In addition to the regular capacity testing, the CBA allows you to calculate the internal resistance of a battery, which is a critical measure of the performance you can expect. Generally, a rechargeable battery fails when its internal resistance rises above a certain value. By monitoring this value you can tell when a battery is about to fail, so you can replace it before it fails when you need it. Also, when building a battery pack, you can more accurately match batteries for optimum performance. Remember that the first battery

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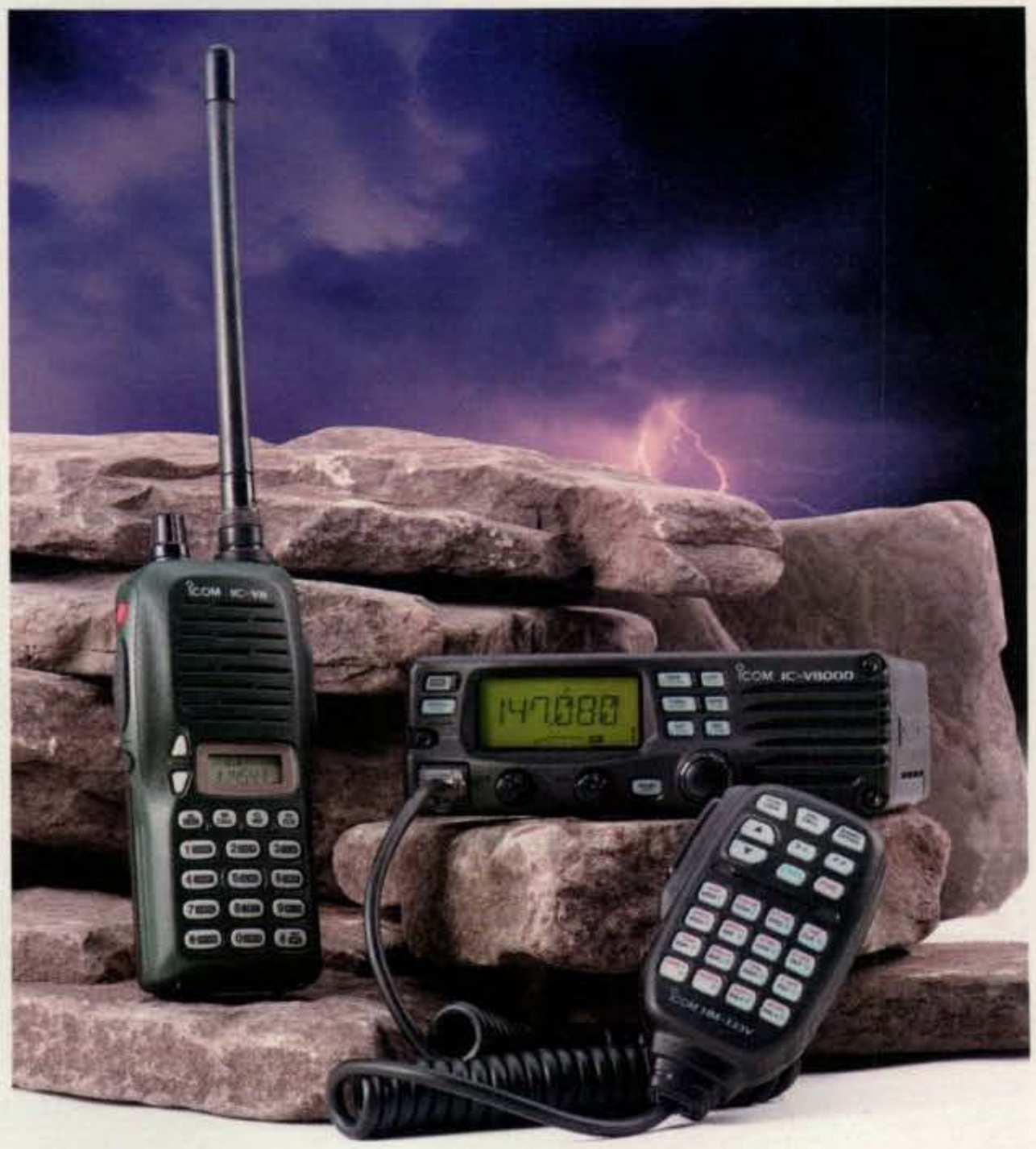

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to fail determines when the entire battery pack fails. Finally, you can try different battery chargers and charging techniques to see which one gives you the best performance. Those of you who are into robotics or radio control will find this particularly useful.

As I mentioned, in most cases the default parameters for the test are fine. In some cases, though, you might want to adjust these parameters to increase the accuracy and relevance of the results. For example, I have a 7.2-volt NiCd R/C car battery pack that I use to power my HT for extended use. It is rated at 2200 mAh (2.2 Ah), so the software selects a 2.2-amp discharge current, which for the HT application is far in excess of the actual current demands. Instead, I selected 0.5 amps, which gives me a more realistic estimate of the battery pack's performance in the field. Of course, now the test will take about five times longer to run (maybe as long as five or six hours), but I'll have my results.

Don't be scared by the amount of time a test takes. For the above example, if I only wanted to see which of my battery packs was best, I'd be able to make a valid comparison with the defaults and each pack would take under an hour to test.However, I had a specific purpose in mind and was willing to take the additional time. Del Schier, K1UHF, of West Mountain Radio, says he usually tests NiCd batteries at ten times their capacity ratings, allowing the CBA to analyze a typical battery pack for a handheld in about six minutes. At the other end of the scale, an 80-amp-hour automotive battery would take 10 hours to fully discharge at 8 amps.

Be careful when changing the cut-off voltage. Too high a setting and you leave a lot of energy in the battery. You should see a "knee" (clearly seen in fig. 1), where the voltage starts to fall off rapidly, near the end of the test. Too low a cut-off voltage and you can damage the battery pack permanently; once the knee becomes clear, stop the test. Also, be cautious when manually setting the discharge current as not all batteries can safely source high currents. For example, when I tested the D cells in fig. 1, I reduced the discharge current from the default 10 amps to something more reasonable that wouldn't melt my battery holder. Depending upon the battery chemistry type (it can test Lead-Acid, NiCd, NiMH, Carbon-Zinc, Alkaline, Li-Ion, and Li-Poly batteries), many safety warnings will appear if you're trying to discharge the battery too quickly or do anything that is bad for the battery or CBA. The CBA is heavily protected, electronically and with software, against damage to itself or the batteries being tested.

The CBA also has provision for a thermistor temperature probe, which can shut down a test if the battery overheats. There is a small, but powerful, magnet next to the thermistor head, allowing the probe to stick to many battery cases.

You also need to ensure your electrical connections are good. A loose or high-resistance (e.g., 0.5 ohm) connection will not only distort your test results, it will get hot

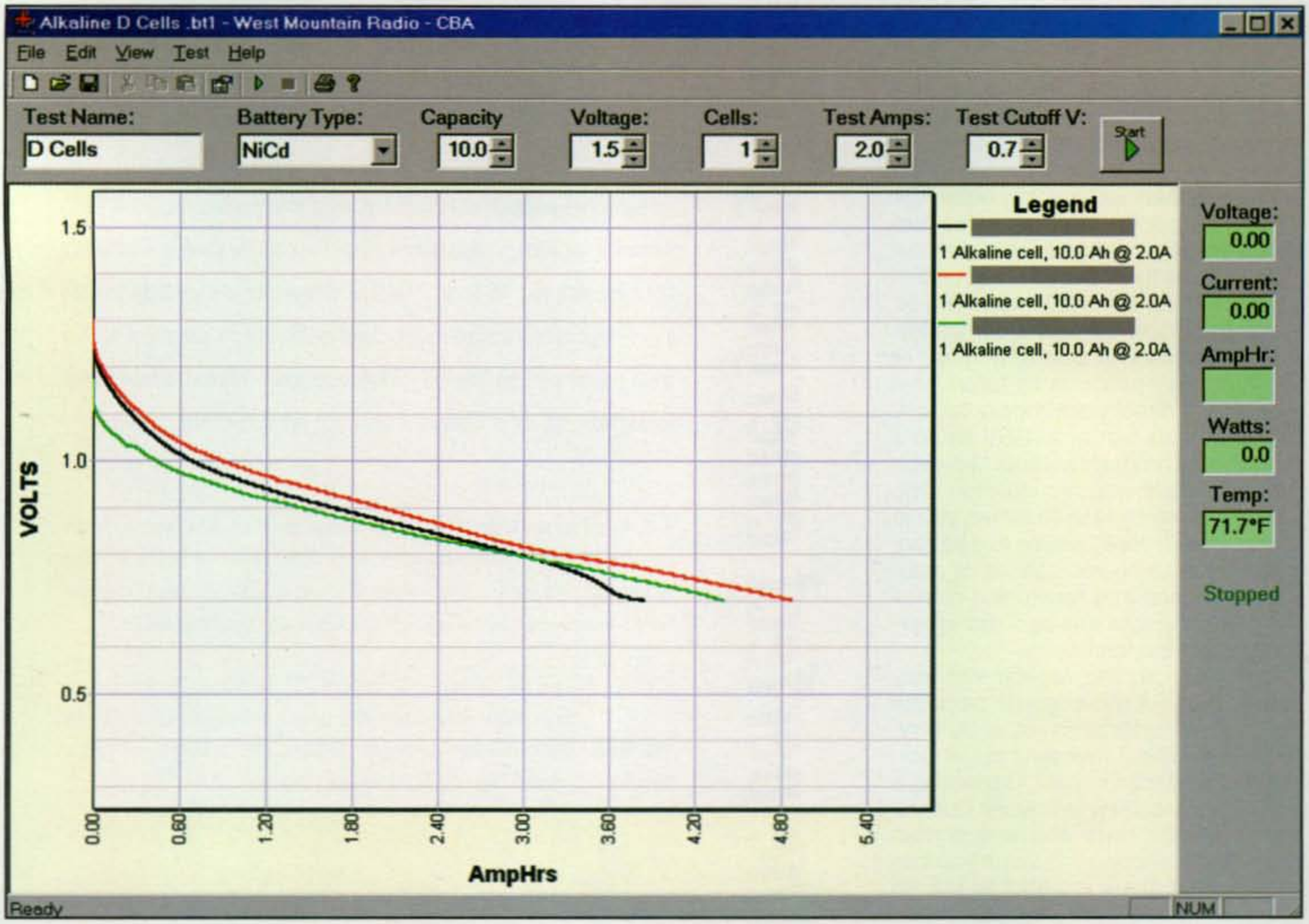

Fig. 1– The CBA II software screen, with test results for three brands of Alkaline D cell. The brand names are grayed out, since a more accurate test would involve multiple test runs and ensure the batteries are fresh. Note that the second brand delivered over 26% more energy than the first brand, yet they both cost the same. When testing rechargeable batteries, it is easy to spot the weakest cell.

very quickly at even moderate test currents.

The CBA itself is very ruggedly built, weighing nearly a pound. There is a massive heat sink (most of that pound) with a cooling fan, which is fairly quiet but noisier than my computer's fan. The battery test connections use Anderson Powerpole connectors, fast becoming the de-facto standard for DC connections. All that remains are two indicator lights—power and testing—and the USB computer connection.

The ratings are equally impressive. The CBA can test batteries up to 48 volts, at up to 40 amps or 150 watts, whichever is higher. The maximum continuous discharge rate is limited to 100 watts. It uses an 8051 processor and has (in the version I tested) 10 bits of resolution in the A/D converter. A software upgrade that came out too late for this review, but is now being shipped, features a 12-bit resolution under 3 amps (that's ±10 mA) and testing down to 0.1 amps (the version I have has a minimum test current of 0.5 amps). The firmware and software can be upgraded by contacting West Mountain Radio.

At a minimum, the CBA software needs a Pentium at 233 MHz, 600 × 800 graphics, and a USB 1.1 or 2.0 port. More speed/RAM/etc. is better. The CBA comes with a CD-ROM with the CBA software, operating instructions, some detailed safety precautions, and basic reference materials. The software installed flawlessly on my Windows® 98 machine, and the testing instructions were clearly written and easy to follow, as you would expect from West Mountain Radio. I found the reference materials a bit thin, but then again, one of my professional specialties as an Electrical Engineer is batteries, so I may have higher expectations than necessary. I wish there was more information on battery chemistries, output and cut-off voltages, and a better discussion of the concept of amp-hours as it relates to discharge current. However, all of this information is readily available on the web somewhere.

Overall, the West Mountain Radio Computerized Battery Analyzer is an excellent value at the $100 price class. It allows you to compare batteries and battery packs to choose the best performance, identify batteries that are reaching the end of their useful lives, and maintain performance records for all the batteries you own. If you use and depend on batteries on a regular basis, this tool will help you get the most from them. More information is available at <www.westmountainradio.com>; just click on the CBA product picture. ■

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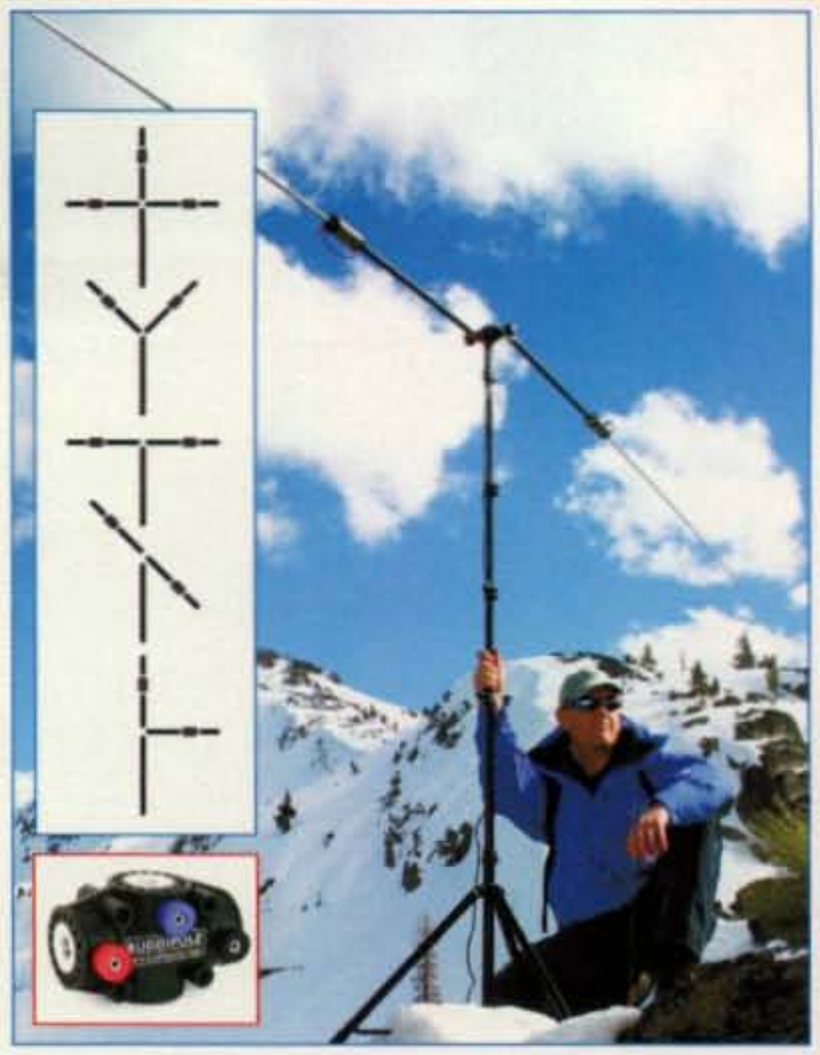

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Do you have "what it takes"—mentally—to be a DXpeditioner? And just what DOES it take? Psychology professor NEØP decided to find out what makes DXpeditioners "tick" and if there are personality traits that differentiate them from other hams.

Is there a "DXpedition Personality"?

A study of the personality factors in DXpedition operators

BY JOHN GEIGER,* NEØP

Nearly every ham, at one time or another, has dreamed of going on a DXpedition to a rare place. The thrill of being on the other end of the pile-up, of being the main subject of cluster spots, and of being the talk of the DX community is very appealing. I know that I have often dreamed about being on an uninhabited reef in the Indian or Pacific Ocean, with everyone searching for me, and of endless DX runs. However, there are other thoughts that usually creep in: Do I have what it takes psychologically to accomplish that? Could I handle the isolation from family, work successfully with a small group of individuals in a remote location, and handle the lack of entertainment when not operating? After all, Kingman Reef is not known for its movie theaters and art museums! To put this in television terms, hams have been survivors long before *Suvivor* hit the airwaves.

Being a professor of psychology (at Cameron University in Lawton, Oklahoma), I decided to find out what kind of personality it does take to be successful on a DXpedition. Certainly other factors are also required: sufficient monetary resources, the ability to leave work for two or three weeks, a very understanding spouse ("You are leaving me alone and going *where*?"), and sufficient operating skills. However, I wanted to find out what personality traits those who have been successful on DXpeditions possess. How would I measure up psychologically with those individuals? Or maybe there isn't a common personality type for DXpedition types. Maybe anyone can learn to handle the isolation, remoteness, and lack of alternative activities apart from radio. I decided to conduct a study to find out.

*e-mail: <johngeig@yahoo.com>

The recent Micro-Lite DXpedition team to Kerguelen Island as FT5XO. Are hams who go on radio expeditions to remote places different from their fellow hams? NEØP conducted a study to find out. (N5FG photo)

Measuring Personality

Psychologists have developed many different models of personality, and the one I chose for this study was the "Big 5" model of personality by Costa and McCrae.[1] This model is one of the most popular trait theories in psychology today and characterizes personality as made up of five main traits. Each trait is seen as a dimension, where one could score from high to low. These traits are:

1. *Extraversion*: A preference for social interaction and a tendency to be active, talkative, optimistic, and affectionate. Introverts tend to prefer solitude and are less active than extroverts. Introverts appear sober, aloof, quiet, and task-orientated. They seem to have less need for stimulation.

2. *Openness*: Interest in new experiences and receptivity to new activities and ideas for their own sake. People who score high on this dimension are creative, curious, and untraditional. People who score low on this dimension tend to be more interested in concrete or practical pursuits. They appear set in their ways and emotionally unresponsive.

3. *Neuroticism*: The tendency to experience negative emotions such as anxiety, anger, and depression accompanied by disruptions of behavior and distressed thinking. Neuroticism is contrasted with emotional stability, which is typical of people who tend to remain calm even in stressful situations.

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4. *Agreeableness*: Taking a compassionate interest in others. People who score high on this dimension are usually trusting and tender-hearted. They are generous in caring for others, sometimes to the point of putting others' needs before their own or even appearing gullible. People who score low on agreeableness are apt to be competitive and are more likely to be manipulative, cynical, skeptical, and openly hostile or rude.

5. *Conscientiousness*: Well organized dedication to work. People who score high on this dimension are ambitious and persistently strive to be achievers. Those who are low on this dimension are less demanding of themselves and others and may seem unreliable and careless.[2]

The test used to measure these five traits was the IPIP-NEO personality inventory,[3] which consists of 120 statements in which the participant rates how accurate or inaccurate the statement is in describing his or her personality. Ratings range from "very inaccurate" to "very accurate." The test takes approximately 15 minutes to complete and can be delivered either online or as a paper and pencil test.

In addition, each one of these five personality traits can be further subdivided into six different facets which make up each general trait. These facets are:

Agreeableness: trust, morality, altruism, cooperation, modesty, and sympathy.

Conscientiousness: self-efficacy, orderliness, dutifulness, achievement striving, self discipline, and cautiousness.

Extraversion: friendliness, gregariousness, assertiveness, activity level, excitement seeking, and cheerfulness.

Neuroticism: anxiety, anger, depression, self-conscientiousness, immoderation, and vulnerability.

Openness: imagination, artistic interests, emotionality, adventurousness, intellect, and liberalism.

Finding a Sample

I turned to the internet to find a sample of hams who had been on a DXpedition to participate in this study. I posted e-mail messages to several different DX-oriented reflectors, looking for hams who had been on a DXpedition to an uninhabited location, as well as hams who had gone to an inhabited location. I was interested in both groups to see how they compared with each other in the area of personality traits. Is there a common personality for hams who choose to go on a more "civilized" DXpedition, or does going somewhere remote and uninhabited require more than just the adventurous spirit that leads one to go on a DXpedition?

I was pleasantly surprised at the responses I received. Many hams seemed interested in the project and were willing to help. Each ham who agreed to participate was sent a copy of the IPIP-NEO personality inventory as an e-mail attachment, which could be downloaded and completed. Each participant then had the option to return it as an e-mail attachment or to mail it back to me.

The sample consisted of 30 hams who had been on a DXpedition to an uninhabited location and 29 who had been on a DXpedition to an inhabited one. I realize that this was a less-than-random sample, as not all hams have access to e-mail or would be subscribers to the reflectors that I used to solicit volunteers. I also sent e-mails to hams who were on some of the major DXpeditions to uninhabited locations in the past ten years and I recruited a few additional participants.

The overall results did not show much difference between hams who went to inhabited versus uninhabited locations. There were no differences in the five main personality traits, and the only dif-

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ference in the facets was for depression. Hams who had been to an uninhabited location were less prone to depression. Since the personality traits and facets were so similar between uninhabited and inhabited DXpeditions, I pooled the data together into one group consisting of hams who had been on a DXpedition and compared them to the general population to see if there is a general "DXpedition personality." I found that there were several personality differences between hams who had been on a DXpedition and the general population. The overall comparisons were as follows:

Extraversion Facets

Friendliness: DXpedition hams scored above average on this measure.

Gregariousness: DXpedition hams scored average on this measure.

Assertiveness: DXpedition hams scored average on this measure. This was surprising, as one would think that DXpedition operators would tend to be "take charge" individuals.

Activity Level: DXpedition hams scored above average on this measure. No surprise here. DXpeditions take a lot of planning and effort, and then there is the actual setting up, operating, and tearing down.

Excitement-Seeking: DXpedition hams scored average on this measure. This one really surprised me. I would have believed that they were above average, as there seems to be a certain amount of excitement in heading out to an uninhabited reef in the Pacific. Maybe this is how they can stand the isolation and lack of non-radio entertainment.

Cheerfulness: DXpedition hams scored above average on this measure.

Agreeableness Facets

Trust: DXpedition hams scored above average on this measure. This finding is good, considering the teamwork, cooperation, and close living quarters that exist on many DXpeditions.

Morality: DXpedition hams scored above average on this measure.

Altruism: DXpedition hams scored average on this measure.

Cooperation: DXpedition hams scored above average on this measure. This is good, since cooperation would seem to be of utmost importance in an uninhabited or remote place.

Modesty: DXpedition hams scored average on this measure.

Sympathy: DXpedition hams scored average on this measure.

Conscientiousness Facets

Self-Efficacy: DXpedition hams scored above average on this measure. This makes sense, because you need to believe that the DXpedition will be a success and that you possess the skills to accomplish the set goals.

Orderliness: DXpedition hams scored average on this measure. This was somewhat surprising, as one would think that organization and scheduling would be key to a successful DXpedition.

Dutifulness: DXpedition hams scored above average on this measure. I am glad to see they are above average on this measure.

Achievement-Striving: DXpedition hams scored above average on this measure. Not much of a surprise here. Going on a DXpedition is definitely an achievement for any ham.

Self-Discipline: DXpedition hams scored above average on this measure. This would definitely help when it comes to living and operating in the less-than-ideal conditions found on many DXpeditions.

Cautiousness: DXpedition hams scored above average on this measure. This is also good. We need to keep those top operators alive to activate Heard Island at the next sunspot peak!

Neuroticism Facets

Anxiety: DXpedition hams scored below average on this measure. After all, DXpeditions are not for the timid!

Anger: DXpedition hams scored below average on this measure. Another thankful finding.

Depression: DXpedition hams scored below average on this measure.

Self-Conscientiousness: DXpedition hams scored average on this measure.

Immoderation: DXpedition hams scored below average on this measure. After all, the South Sandwich Islands is not the place to be implusive.

Vulnerability: DXpedition hams scored below average on this measure.

Openness Facets

Imagination: DXpedition hams scored below average on this measure.

Artistic Interests: DXpedition hams scored below average on this measure.

Emotionality: DXpedition hams scored average on this measure.

Adventurousness: DXpedition hams scored average on this measure, which is surprising. It seems that this measure describes going on a DXpedition. What could be more adventurous than spending ten days on Scarbourgh Reef?

Intellect: DXpedition hams scored average on this measure. However, intellect is *not* to be equated with intelligence. High scorers on intellect love to play with ideas.

Liberalism: DXpedition hams scored average on this measure.

Thus, the above results support what many of us have already observed: People who go on DXpeditions are certainly not "normal." They do seem to differ from the average population in several key personality facets. From these results the beginnings of a DXpedition personality begin to emerge.

The Need for a Comparison Sample

The above findings seem to suggest that hams who go on DXpeditions differ from the normal population in several key ways. However, before any firm conclusions can be drawn about the DXpedition personality, it must be recognized that maybe hams in general differ from the normal population (imagine that!). Thus, the next part of the data collection was to measure a sample of hams who have never been on a DXpedition to determine what the average ham personality is. Once that was discovered, then a better picture of the DXpedition personality would emerge.

A comparison group of non-DXpedition hams was recruited in a similar way, through several different e-mail reflectors. A total of 47 hams participated, and their personality facets were compared to the standard population norms. This comparison would show how hams in general differ from the general population (if at all), and then allow us to see how DXpedition hams differ from hams in general.

The non-DXpedition hams scored significantly above the general population on the following personality facets: trust,

morality, altruism, self-efficacy, dutifulness, achievement setting, self-discipline, cautiousness, assertiveness, activity level, cheerfulness, and intellect. In addition, the average ham scores below the general population on these facets: anxiety, depression, self-conscientiousness, immoderation, vulnerability, imagination, artistic interests, emotionality, and liberalism. If you compare these differences to what was found for the DXpedition hams, it seems that with many of these traits hams in general differ from the population, not just hams who go on DXpeditions.

The DXpedition Personality

The final comparison of DXpedition hams to non-DXpedition hams shows that the groups differ on six personality facets. Hams who have been on a DXpedition score higher on cooperation, cheerfulness, and liberalism, and score lower than hams in general on assertiveness, immoderation, and intellect. Some of these personality differences were expected, whereas others were somewhat surprising. It was also surprising to find how different hams in general scored from the overall population on many of these traits. Therefore, putting these traits together yields a picture of a DXpedition operator who is cooperative without being too much in control, and who has generally positive feelings about life without being too impulsive or prone to cravings. They are also about average in their challenging authority or manipulating ideas, but different from hams in general on these two facets.

This project represents one attempt to determine what makes a good DXpedition operator. Certainly things such as operating skill, experience with other cultures, and general knowledge play as big as factors as personality. Still, it may be useful to try yourself on the IPIO-NEO or some other personality measure before signing up for that next DXpedition to Crozet Island. You might be surprised what you find! ■

Notes

1. Costa, P. T. and R. R. McCrae. "Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory," *Journal of Personality and Social Psychology*, 54, 853–863 (1988).

2. Nietzel, M. T., M. L. Speltz, E. A. McCauley, and D. A. Bernstein, D.A., *Abnormal Psychology*. Needham Heights, MA: Allyn & Bacon (1998).

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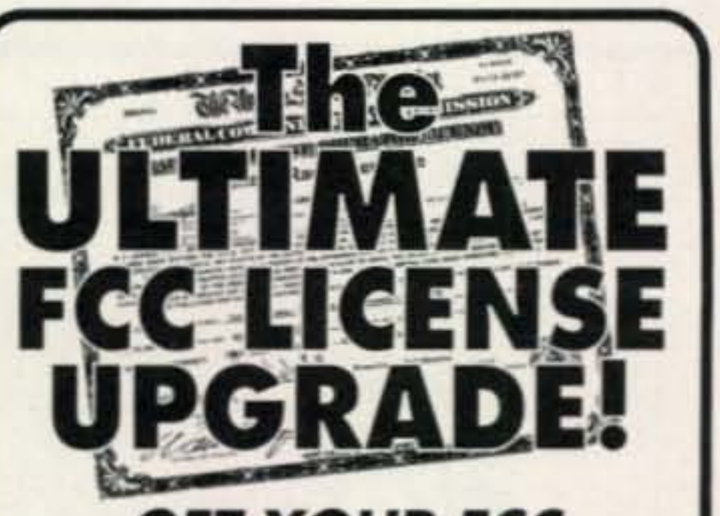

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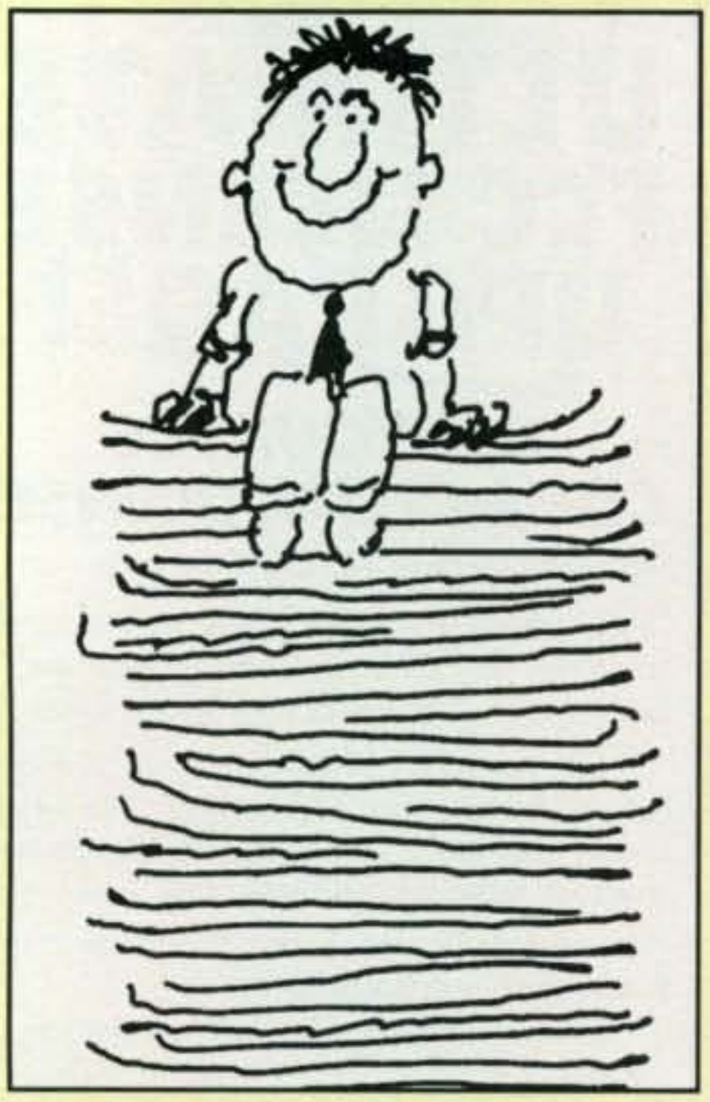

What You've Told Us...

Our April survey asked about your experience with contacting and QSLing DXpedition stations. It was little surprise that 84% of you said you'd contacted a DXpedition station at least once. Regarding your most recent attempt to contact a DXpedition station, 74% of you said you were successful. More than half of you—56%—say you got through to the station in 15 minutes or less (7% got right through; 13% made contact in less than a minute; 21% got through in 1-to-5 minutes, while 15% waited 5-to-15 minutes), and 29% had to wait more than 15 minutes to contact the expedition station. In addition, 50% of you said you tried to make additional contacts with the DXpedition on another band, while only 25% tried for an additional mode.

Generally speaking, 76% of you rate the QSLing practices of DXpedition QSL managers as good or excellent (46% excellent, 30% good), while only 34% feel the QSL Bureau system is good or excellent. Only 4% rate QSL managers as mediocre or poor (3% mediocre, 1% poor), while 25% feel that way about the bureaus (18% mediocre, 7% poor).

In addition, while only 18% have actually been ON a DXpedition, a majority of you (52%) have helped make DXpeditions possible by contributing financially to one or more of these radio adventures.

This month's free subscription winner is David Beghtel, KM4BS, of Bradenton, Florida.

Reader Survey
July 2005

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

With our focus on young people in this issue, we'd like to ask about your involvement with promoting ham radio to young people.

Please answer by circling the appropriate numbers on the reply card.

1. Have you ever demonstrated ham radio to one or more young people (under 21)?
Yes.....1
No.....2

2. To what size group(s) have you demonstrated ham radio? (Circle all that apply)
Individuals only.....3
2–10 people.....4
11–25 people.....5
25–75 people.....6
Over 75 people.....7
None.....8

3. How frequently do you demonstrate ham radio to young people?
More than once a year.....9
About once a year.....10
At least once in the past 5 years.....11
Intermittently.....12
Just once.....13
Never.....14

4. Do you (or members of your group) follow up on the demonstration(s) by offering licensing courses?
Yes, always.....15
Yes, sometimes.....16
No.....17
Don't know.....18

5. Do you (or members of your group) follow up on the demonstration(s) by offering license exam sessions?
Yes, always.....19
Yes, sometimes.....20
No.....21
Don't know.....22

6. Do you (or members of your group) follow up with newly-licensed hams by offering to help them get set up and on the air, and answering their questions?
Yes, always.....23
Yes, sometimes.....24
No.....25
Don't know.....26

7. Have you ever helped teach a licensing course?
Yes.....27
No.....28

8. Have you ever helped give license exams?
Yes.....29
No.....30

Thank you very much for your replies. We'll be back next month with more questions.

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Announcing:

2005 Inductees

CQ Amateur Radio, Contest, and DX Halls of Fame

CQ is proud to regularly honor the most accomplished members of the amateur radio community through three "Halls of Fame": the CQ Amateur Radio Hall of Fame, the CQ Contest Hall of Fame, and the CQ DX Hall of Fame. We are pleased to introduce you to this year's inductees.

CQ Amateur Radio Hall of Fame

Our fifth annual "class" of inductees to the CQ Amateur Radio Hall of Fame includes 14 individuals in one of the following two categories: (1) Those individuals, whether licensed hams or not, who have made significant contributions to amateur radio; and (2) those amateurs who have made significant contributions either to amateur radio, to their professional careers, or to some other aspect of life on our planet. This year, once again, all are or were licensed hams. Please note that callsigns were as issued to these individuals when they were alive/active and may have been reissued under the vanity callsign program.

We welcome the following members (listed alphabetically) of the 2005 "class" of the CQ Amateur Radio Hall of Fame:

Ambrosi, Mario, I2MQP. Prominent Italian amateur, author of many radio books, QSL manager, top official of Italian national amateur radio association and Editor of its magazine, *Radiorivista.*

Chambers, John, W6NLZ. With KH6UK, proved the existence of the California-Hawaii VHF/UHF propagation "duct," completing the first 2-meter contact over the 2500-mile path in 1957.

Cohen, Ted, N4XX. *CQ* author for more than 30 years, including many "CQ Interviews" with top federal officials; propagation expert and co-author of *The NEW Shortwave Propagation Handbook*; authored the first federal RFI bill to become law (for which he was awarded the ARRL's Technical Merit Award in 1975).

Ferraro, Bob, W6RJ. President of Ham Radio Outlet, major supporter of many DXing and contesting activities, including all of the World Radio Teamsport Championships to date.

Hargreaves, William "Bud," K4HMV. "Father of the Polycomm," designed (among other radios) the first combined 6- and 2-meter transceiver and the first VHF transceiver with a built-in VFO.

Harris, Chod, VP2ML. Noted DXer, Founding Editor/Publisher of *The DX Magazine*; *CQ* DX Editor.

Harrison, Ivan "Sonny," W5HBE. Developed the "Carterphone" phone patch to connect radios to the telephone network, leading to the U.S. Supreme Court's "Carterphone" decision, which opened the door for connecting all sorts of devices, including computers and modems, to the telephone network. This paved the way for widespread internet and e-mail access via "dialup" connections.

Marriner, Edmund, W6BLZ/W6XM. Author of dozens of construction project articles in *CQ,* particularly about antennas and surplus conversion.

Meshevtsev, Boris, RV3IZ/EX3TM. Prominent (blind) Russian contester, DXer, and author of radio books; also professional musician.

Moxon, Les, G6XN. Antenna developer, author of highly regarded books on HF antennas and "Modern Radio Technique."

Sigmon, Loyd, W6LQ. Developed first radio traffic alert system, "SigAlert," in Los Angeles, precursor of today's radio traffic reports.

Smith, Phillip, 1ANB. Inventor of the Smith Chart for determining transmission-line impedances, still an essential tool for RF engineers and the basis for computer programs performing the same tasks. Also invented the cloverleaf FM broadcast antenna, and a transmission-line matching stub, among his 20 patents; was also an early radar engineer.

Taylor, Jonathan, K1RFD. Developer of Echolink, Voice over Internet Protocol (VoIP) network for linking repeaters and individual amateurs via the internet.

Thomas, Ralph, W2UK/KH6UK. With W6NLZ, proved the existence of the California-Hawaii VHF/UHF propagation "duct," completing the first 2-meter contact over the 2500-mile path in 1957.

CQ Contest Hall of Fame

The CQ Contest Hall of Fame is pleased to welcome two new members this year, Jeff Briggs, K1ZM, and Charles "Rusty" Epps, W6OAT.

Jeff Briggs, K1ZM

Jeff was nominated by the Yankee Clipper Contest Club (YCCC). He holds more than a dozen records in various contests, has won more than a dozen contests in his operating class, has operated on 16 contest DXpeditions and in two World Radiosport Team Championships. Jeff has built equipment and specialized antenna systems for three contesting stations, in New York, Cape Cod, and Prince Edward Island, and has mentored many contesters in more than 25 years as a world-class competitor.

Jeff was a founding member and first president of YCCC and has devoted a

Jeff Briggs, K1ZM (right), CQ Contest Hall of Fame inductee 2005, is shown here with his brother George, K2DM, at the A61AJ super station for the CQ WW DX CW Contest in November 2000. (K2RED photo)

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tremendous amount of time to learning about his favorite band, 160 meters, then sharing his knowledge with others as author of the ARRL book, *DXing on the Edge: The Thrill of 160 Meters,* as well as a number of magazine articles on "top band" and on contesting, and by helping with band-planning and interference issues affecting 160.

Charles "Rusty" Epps, W6OAT

Rusty is a co-founder of the World Radiosport Team Championship (WRTC), co-creator of the North American Sprint contest, and was a founding member of the Northern California Contest Club (NCCC), which nominated him. Rusty formerly held the record for the greatest number of top-ten finishes in ARRL Sweepstakes (including a #1 finish in 1985) and is one of only four people in the last 30 years to win the ARRL International DX Contest's Single-Op All-Band High-Power category from the U.S. west coast. He also set the South American multi-single record in the 1981 CQ World-Wide DX Contest (CW) from P41E.

Rusty also created the Georgia QSO Party while still in high school, and recently has become active in RTTY contesting (watch out, RTTY contesters!).

Rusty Epps, W6OAT, 2005 inductee in the CQ Contest Hall of Fame. He is also a member of the CQ DX Hall of Fame (1996).

Masayoshi Ebisawa, JA1DM (left), 2005 CQ DX Hall of Fame inductee. He is shown here with Jim Haynie, W5JBP, president of the ARRL, at the 2004 Dayton Hamvention®.

CQ DX Hall of Fame

The CQ DX Hall of Fame welcomes one new member for 2005, Masayoshi Ebisawa, JA1DM:

Masayoshi Ebisawa, JA1DM

JA1DM is arguably Japan's top DXer, with a total of 382 confirmed entities (#1 ranking in Japan). He is the lead card checker for DXCC in Japan and has written and/or translated several articles about DXing and the ARRL's new "Logbook of the World" system for Japanese ham magazines. He has been licensed continuously since 1953, has operated on DXpeditions, and is a former director of the Japan Amateur Radio League and was a JARL delegate to last year's IARU Region 3 conference. Masayoshi was nominated by the ARRL.

Congratulations to all of our new inductees on your outstanding accomplishments!

math's notes

BY IRWIN MATH,* WA2NDM

Optical Communications Revisited—Part II

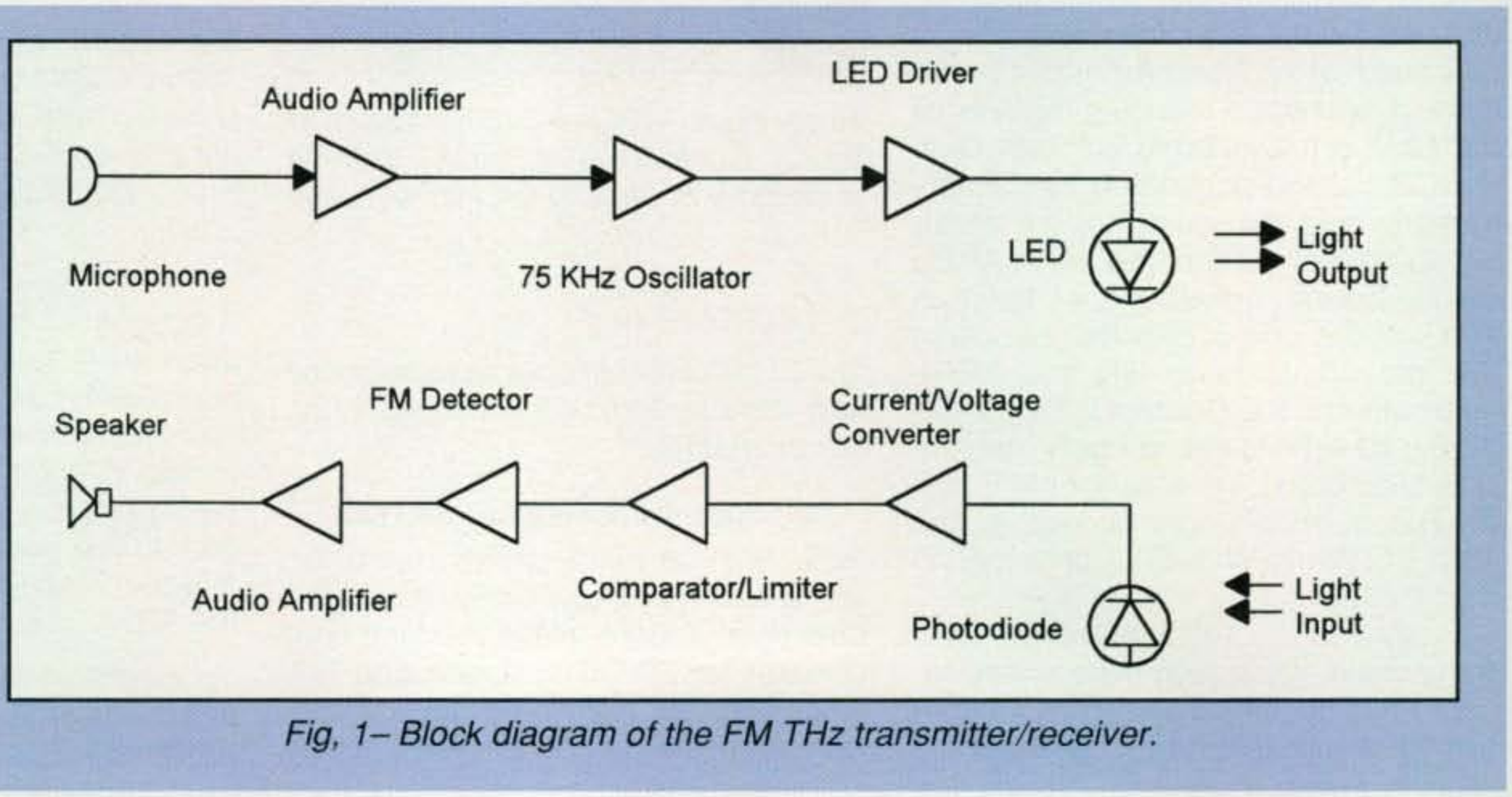
Last month we built the transmitter portion of an FM-modulated optical communications system. This month we will concentrate on the receiver. Fig. 1 is the block diagram of the complete system. The transmitter accepts audio from a microphone, amplifies it, and then drives a 75-kHz (nominal) voltage-controlled oscillator. This produces an output pulse stream that is FM modulated by the incoming audio. The pulse stream is then used to drive an LED light source. At the receiver, a photodiode converts the modulated light pulses into tiny current pulses, amplifies them, and then limits them to eliminate any residual AM. The amplitude-limited pulses are then demodulated by an FM detector and converted back into audio. The resulting audio is amplified and applied to a small speaker or pair of headphones.

Fig. 2 is a schematic of the receiver's front end. The first stage is a current-to-voltage converter using a high-speed op-amp. This can be almost any voltage-mode op-amp with an open-loop bandwith of at least 10 MHz or higher, such as (but not limited to) the types indicated on the schematic. Since the received carrier is at 75 kHz, the wide bandwith of this stage will assure that a clean square-wave signal with good rise and fall times will be reproduced. Tiny current from the photodiode is converted to a voltage by this stage in accordance with a transfer function of anywhere from 10,000 to 110,000 times, depending on the setting of the 100K potentiometer. This means that an input current of 10 microamperes (corresponding to 20 microwatts of light at 850 nm, for example) will produce an output in the range of 10 to 100 millivolts (again determined by the setting of the pot).

This signal is then applied to an LM311 comparator. The signal itself is applied to pin 2, while a differentiated version of the signal is used as a reference and connected to pin 3. Since the input is roughly a square wave (at 75 kHz), regardless of the degree of modulation the capacitor across pin 3 will always charge to approximately 50% of the peak-to-peak amplitude of the input. This forces the comparator to switch at or close to the center of the square wave, with the result that a minimally distorted 5-volt pp signal will appear at the output (pin 7) of the LM311. Since any variation in the amplitude of input signal will also result in a similar variation in amplitude of the reference voltage (at pin 3), the comparator will always readjust itself to switch at (or close to) the 50% point. This feature neatly eliminates any AM component that might be present, which is of course what the limiting function in an FM receiver is supposed to do. If you have a scope, you can see how this works by comparing the signals on pins 2, 3, and 7 of the LM311 while you vary the input signal level.

Now that we have produced a constant amplitude signal, it is time to convert it back into audio. Fig. 3 is the schematic of the FM detector and the audio output stage. An LM568 phase-locked loop is used here as the FM detector. The 10K pot is used to tune the detector to the frequency of the incoming signal, and when properly adjusted, the resulting output will be low-level audio. A simple 1K resistor and 0.01 µF capacitor form a low-pass filter in series with the output to remove any residual 75-kHz carrier but still allow the recovered audio to pass. The final stage is our favorite, the

*c/o CQ magazine



Fig, 1– Block diagram of the FM THz transmitter/receiver.

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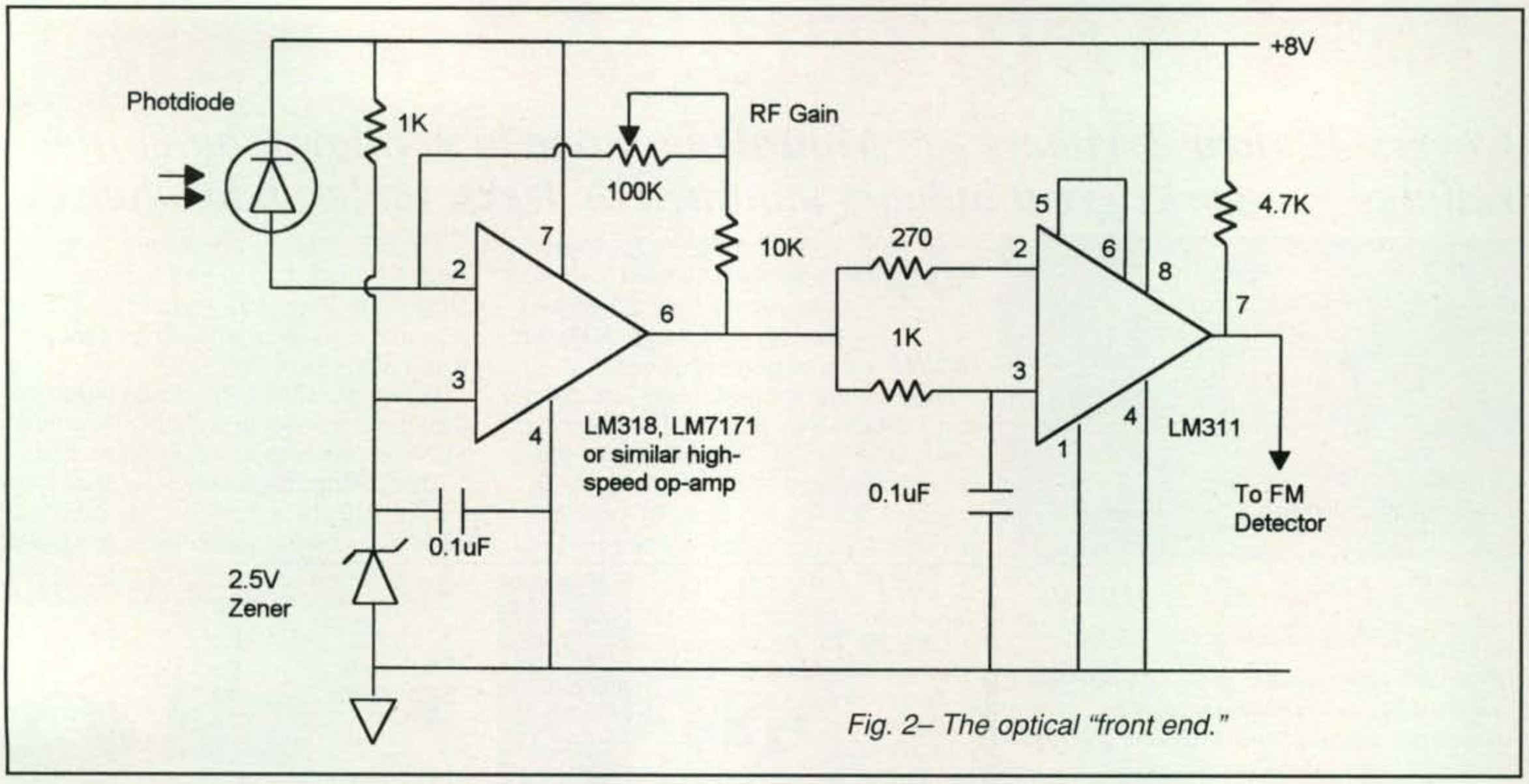

Fig. 2– The optical "front end."

LM386 audio amplifier. It provides enough gain to drive a small loudspeaker or pair of headphones.

Adjusting the detector involves setting the 10K pot to twice the expected received signal frequency (in this case 150 kHz) as measured at pin 5 of the LM568. The best way to do this is with a frequency counter connected to pin 5 through a common low-capacitance (10 pF or less) 10X oscilloscope probe. The capture range of the LM568 is pretty wide, however, so this setting is not especially critical. If you do not have a scope, you can simply adjust the 10K pot for the best overall recovered audio. Power for the entire optical receiver is provided by a simple regulated power supply as shown in fig. 4, and since this is exactly the same supply used for the transmitter, you can simply build one and use it for both.

After all is built and the various stages have been "smoke" tested, it is a good idea to do a preliminary overall system check. This will give you the assurance that all is working properly before you start on the optical "antenna" portion of the project. For preliminary testing purposes any high-output, visible red LED and silicon photodiode will do. However, when connecting the photodiode, be sure to keep the lead going to pin 2 of the op-amp as short as possible. Because of the high gain and wide bandwidth of this stage, the input lead can easily act as an "antenna"; if it is too long, noise and other extraneous signals will be picked up and interfere with normal operation. A lead length of 1/4 inch or less is ideal.

To begin, first place the transmitter's microphone next to a continuous source of audio, such as the output of a radio or stereo. Next temporarily connect the transmitting LED to a couple of wires and arrange it so that it is pointed directly toward the receiving photodiode and about 6 inches away. Now adjust the various pots until a clear, undistorted signal is received.

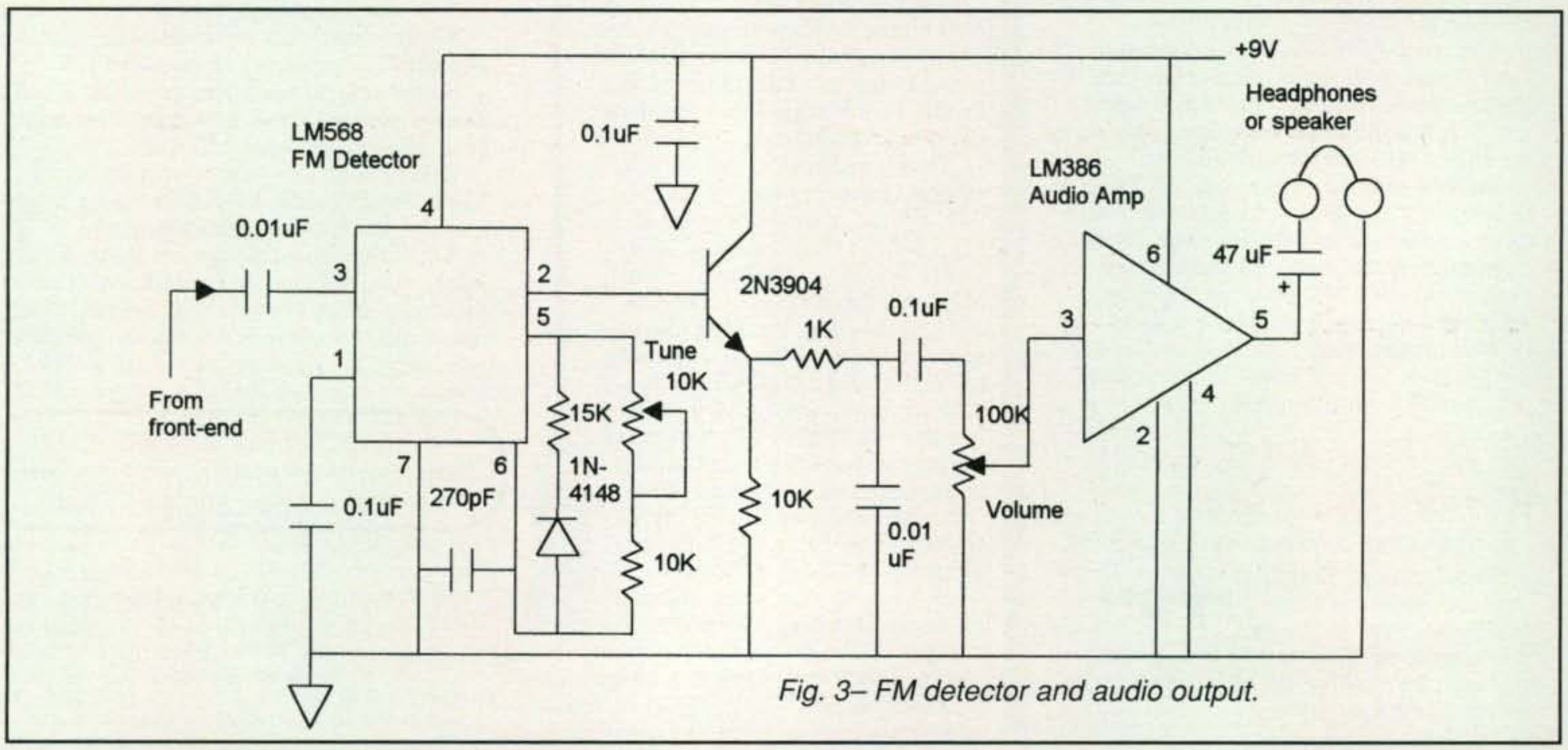

Fig. 3– FM detector and audio output.

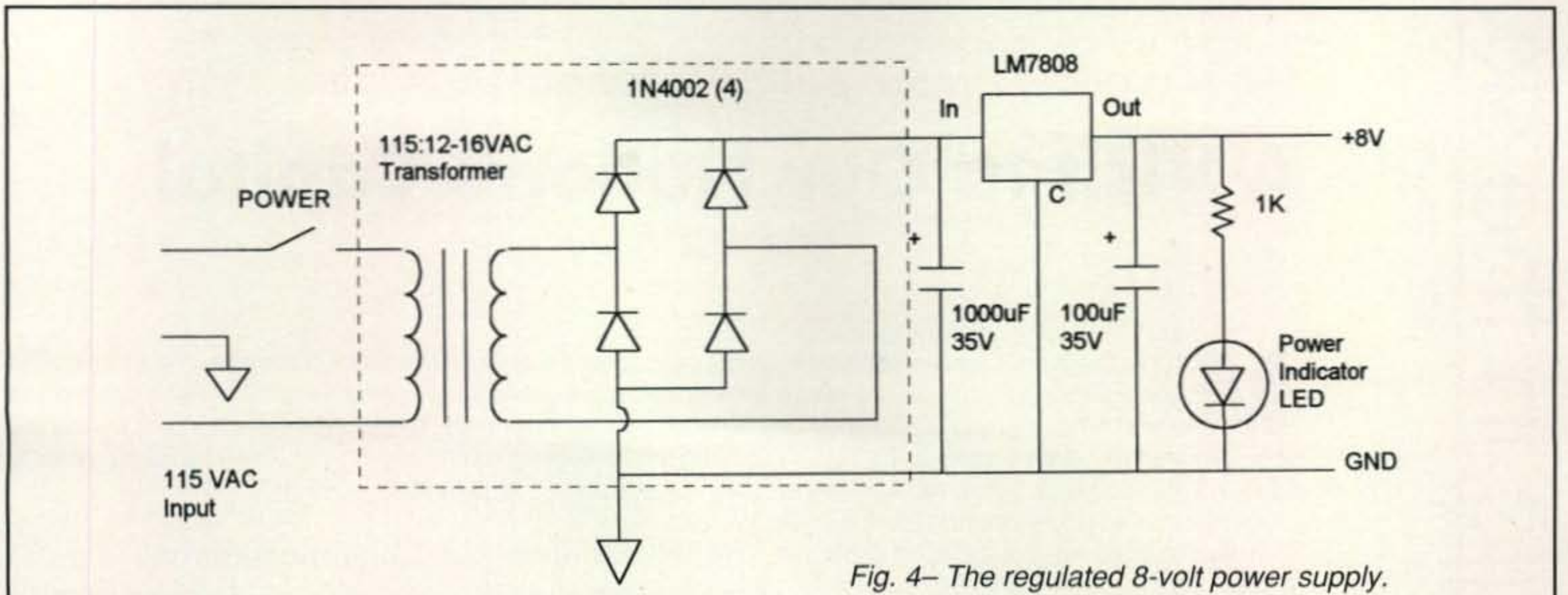

Fig. 4– The regulated 8-volt power supply.

Slowly move the transmitting LED out of the direct path of the photodiode (to reduce the received signal level) and again readjust all of the potentiometers until maximum sensitivity is achieved. If you are careful, you may be able to actually receive signals reflected off a wall at the far end of the room in which you are working. If you have any problems along the way, use a scope and probe all stages one at a time, starting with the transmitter, until you find the stage with the problem.

When all is operating properly, you can replace the test LED and photodiode with the final devices and "touch up" the LED current if needed. Then mount the transmitter and receiver circuit assemblies in the housing of your choice. If you have chosen to use a single power supply and enclosure for both the transmitter and receiver, the result will be a neat optical transceiver.

Next month in part three of this series we will discuss various LEDs, photodiodes, and optical "antenna" possibilities, as well as various ways to extend the range of your optical communications system.

73, Irwin, WA2NDM

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BY JEFF REINHARDT,* AA6JR

What could be more patriotic for our July issue than . . .

A Visit to Our Nation's Capital

Much of the work I do professionally involves dealing with government at many different levels. Occasionally, it's necessary for me to either visit my state capital or travel to Washington, D.C. to monitor or comment on legislation.

While to many that sounds as if it could be fun, it really requires a lot of detailed work, not only for people doing the same thing, but for the congressional representatives, senators, and their staff members. One doesn't just "drop-in" on a congressman or senator (although you might sometimes catch a lucky break); conferences must be scheduled days or weeks in advance. It usually involves a frenzied schedule of meetings, all of which are subject to delays and cancellations, particularly if there are critical hearings or votes. One also finds that the three House of Representatives office buildings are large and spread over out a wide area, while the Senate office buildings are about a half mile away. Of course, the scheduling usually finds me jumping randomly among all of them. Security measures now in place require screening each time one enters a building, adding time to the process.

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e-mail: <aa6jr@cq-amateur-radio.com>

Establishing Communications

When wandering the corridors of our government's "nerve center," you quickly learn of the many interests tugging at the sleeves of our legislators. In the few days I was there, I noticed active military wearing their uniforms; retired military, identifiable by their American Legion caps; cattle interest groups proudly wearing their Stetsons; members of a brewing association (wearing buttons but regrettably not carrying any of their wares); representatives of some type of physical-therapy association wearing their lab coats as they made their rounds; and hundreds of unidentifiable "suits," like me. Otto von Bismarck was right: You're really better off not knowing how sausage—or legislation—is made.

The National Mall, as viewed from the portico of Senate Minority Leader Harry Reid's office in the Capitol building. (With thanks to the Senator and his staff; photos by the author)

The World War II Memorial pays tribute to those who saw the nation through that terrible conflict, with elements that recognize the Atlantic and Pacific theaters.

NN3SI is the amateur radio station of the Smithsonian Institution. You can actually operate it by making arrangements in advance.

Many meetings are held with the representative's staff members, and most of them work in pretty tight quarters with a desk and little else. Space is so tight that meetings are often conducted in the greeting area, in the hallway outside the office, or sometimes in the basement cafeteria. If you get 10 or 15 minutes with a staff member, that's pretty good. If you get that amount of time with the actual representative, that's stellar (particularly if you're not a major campaign contributor, and while that sounds cynical, it's reality). If you are with the elected rep, your meeting can be cut short by a loud buzzer or bell that sounds like a security alert but actually summons the representatives for a vote taking place on the floor in the Capitol building, at which point they may quickly depart. That's why it's best to keep conversations short, on-point, and confined to a single topic.

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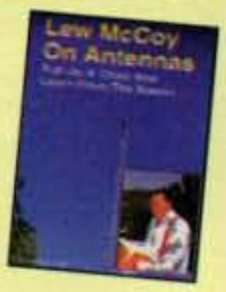

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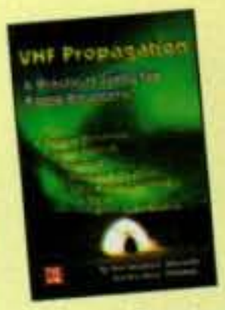

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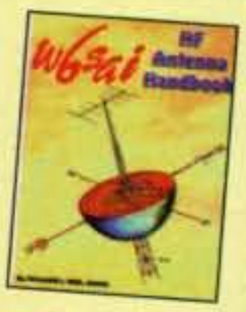

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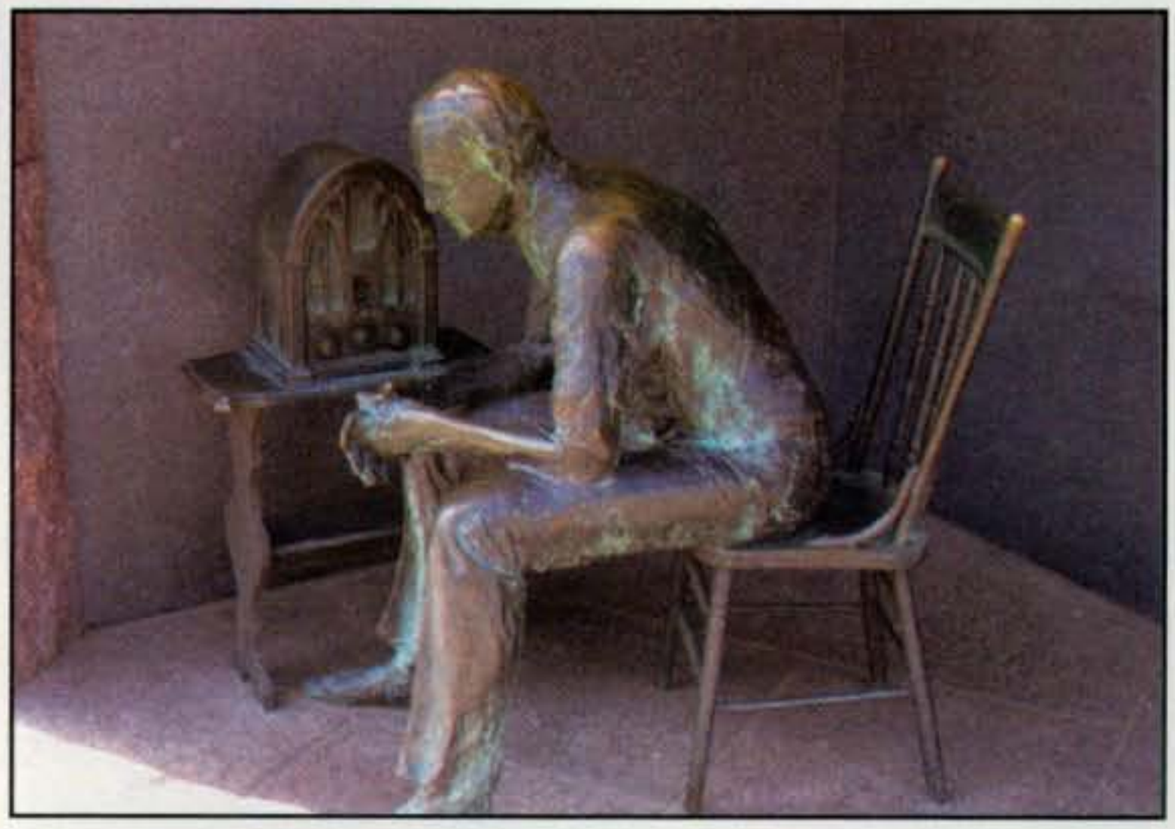

Radio played the central role in President Roosevelt's Fireside Chats, as captured in this sculpture found at his memorial.

After you become part of this process, you gain a quick understanding of the fact that there are thousands of special-interest groups vying for attention, promoting one cause or another. I think if you hang around long enough, you might bump into an association for left-handed comb manufacturers; it seems every interest has a group. You also realize that no one can have a thorough understanding of all the issues and causes. The representatives and staffers do their best, but I believe they're in a constant state of "triage," sifting through the voluminous information that comes into their offices each day. I also believe that's why it's so difficult for Congress to really address our concerns as radio operators.

Many members of Congress and staffers just don't understand the technical issues, such as BPL (Broadband over Power Lines). It's very complicated (I dare say, many hams don't understand it), it has intricate legal ramifications, and again, not to be cynical, the BPL industry stands to make a lot of money and money talks in D.C. Unfortunately, ham operators don't wield campaign contributions or a powerful PAC (Political Action Committee), as do other groups such as the NRA (National Rifle Association). That's no reflection one way or the other on the NRA; it's just the way it is. The ARRL does its best to represent us in D.C., but the stark reality is we don't present a powerful voting bloc and we don't have a sizable war chest.

What Do We Have?

All is not lost. You still vote (don't you?). Send your concerns in a very brief letter or on a QSL card with a message to your representative. You can find your representative at <www.house.gov> or via the "Contact Your Elected Officials" link on the *CQ* website at <www.cq-amateur-radio.com>. A piece of paper is something that must be handled; e-mail is quickly handled and disposed of. Remember the "triage" approach—make your point quick and identify the issue in bold type at the top of your letter. Get members of your club to do the same. One letter may not get much attention, but 10, 20, or more hit the "radar screen" of those who track constituent communications.

The Fun Part of D.C.

On a recent trip I stayed into the weekend to explore some of the unique national treasures of Washington. Amid the

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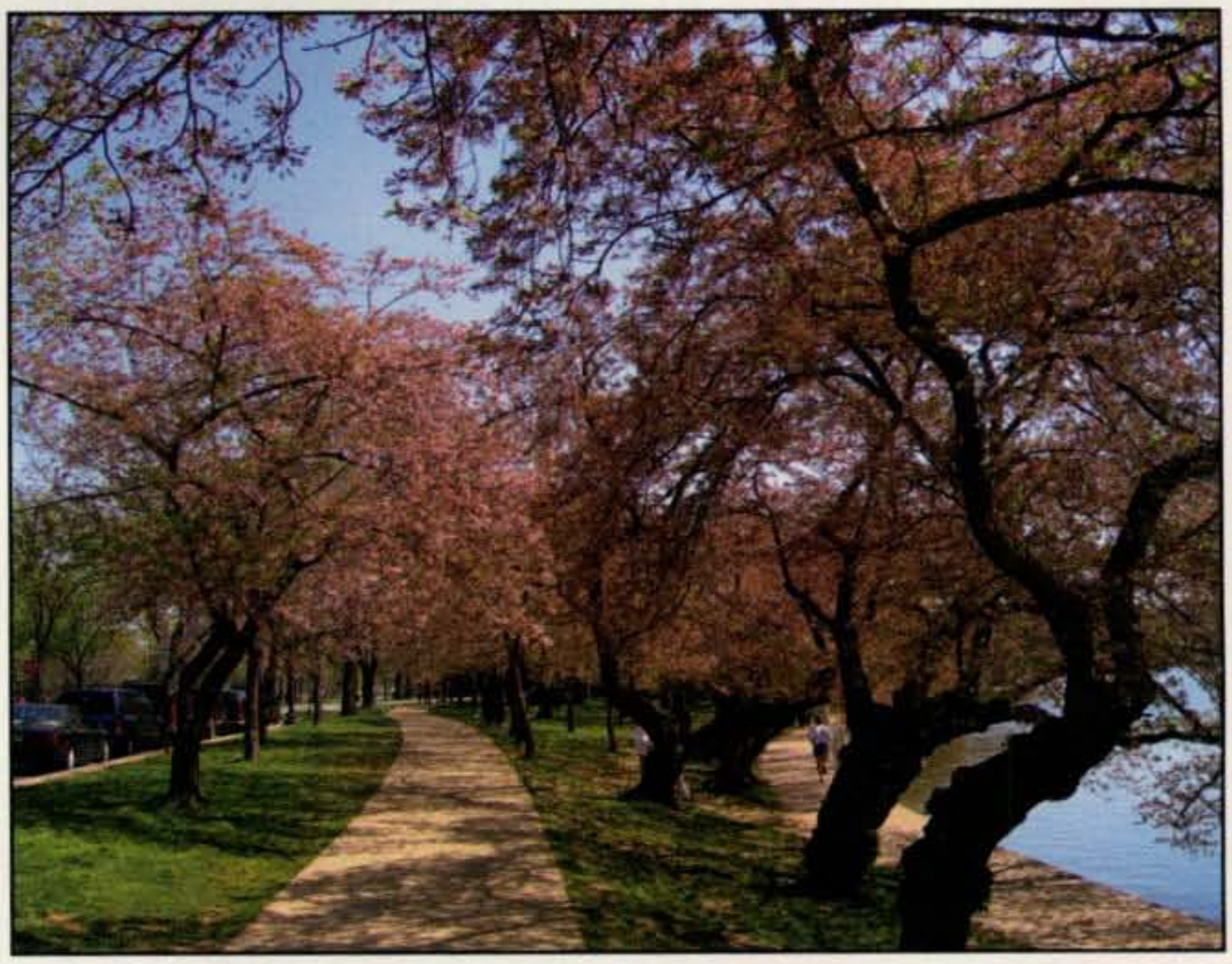
beautiful last blooms of cherry-blossom season I did lengthy walking tours of the Jefferson Memorial, the relatively new Franklin Delano Roosevelt Memorial, the Smithsonian museums and the emotionally moving World War II Memorial which opened just last year on the National Mall. It's a suitable and long-overdue tribute to "The Greatest Generation." It was well attended and many WW II veterans were in evidence, finally seeing a fitting monument to their sacrifices.

Ham Radio At The Smithsonian

I love American history and heritage. In a Smithsonian museum dedicated to those topics you can see many wonders, from the original flag that inspired the *Star Spangled Banner* to a display that captures the evolution of ground transportation from animal carts to the present. Tucked in a corner I also found the Smithsonian's functional ham radio station, NN3SI. Unfortunately, there was no volunteer operator on duty, but it was heartening to know that there are some and that visitors may also try to schedule time operating the station. Had I known about it in advance of my trip, I would have done so.

A sign posted at NN3SI states that any licensed radio amateur may arrange to be a guest operator. A copy of your license, a photo ID, and an appointment are necessary. For more information, call 202-633-3852 or 202-633-3857. While there, I had a nice conversation with an ex-ham, and I think I convinced him to take the exams needed to restore his expired license. Kudos to the ARRL Foundation for a grant that made possible the station's presence at the Smithsonian.



Is there a better time to be in Washington, D.C. than when the cherry blossoms are in bloom?

A better look at some of the gear at NN3SI.

The Library of Congress and More

If you think the Library of Congress is just a collection of dusty books, think again. While I could not spend much time there, I enjoyed a wonderful exhibit dedicated to the extraordinary career of Bob Hope. It's well worth seeing, along with many other displays and exhibits.

The newly revamped National Archives contains not only the original Declaration of Independence, Constitution, and Bill of Rights, it also now has many interactive displays of historical recordings, video and audio.

The National Gallery of Art not only commemorates great works of art, it celebrates the creativity that serves as a manifestation of the human condition.

Bringing It All Together

During my return flight to L.A., I was going through my notes and it dawned on me how it all comes together for us as communicators. Jefferson and the founders of our nation bestowed on us the gifts of freedom that guarantee rights, the ability to express one's views, and a foundation for us to pursue life, liberty, and happiness. America was the leader not only in these political concepts, but also in communicating the benefits of freedom throughout the world. Franklin Roosevelt used radio as a means to calm the nation's fears and to communicate a call to action that saved the world from tyranny. Our World War II veterans relied on communications to achieve the ultimate victory. Bob Hope further symbolized not only the broad reach of entertainment through communications, but also the use of electronic media to spread artistry and good will. And you don't need to visit the Smithsonian to know that we, as hams, helped to create nearly all of the major developments in communications that made so many of our nation's modern achievements possible.

This July 4th take pride not only in celebrating America's birthday, but also in your role in that most "American" of pursuits—using that federally issued license of yours to build and maintain the "Magic In The Sky." 73, Jeff, AA6JR

HF'n on the Road

BY DAVE INGRAM,* K4TWJ

Ah, those lazy, hazy days of summer return once again, bringing with them all the joys of hamming in the great outdoors, of taking that long-awaited road trip just for fun. Yes indeed, there is nothing quite like getting sunburned at the beach, half-drowned at the lake, and what's left taken off by giant mosquitoes in the back woods. Life is grand!

What do you need to join these irresistible activities? Very little. A compact transceiver (even a QRP rig is fine), a handheld microphone and/or a palm-size key, and a simple mobile whip antenna will get you going in style. Once in the game, you will be better situated to visualize your needs and preferences so you can put together your own custom setup. Being an active "insider" rather than an outsider is the key.

That is precisely the thrust of this month's column—sharing "how to do it" notes plus details of some neat new goodies to inspire your creative thinking. Let's begin with some helpful tips for putting out a top-notch mobile signal.

Photo 1– Mike Pilotti, KF3CD, adds a special twist to his mobile activities by seeking out and operating from award-supporting IOTA (Islands On The Air) locations such as this New Jersey island near his home. His setup consists of a Yaesu FT-100 and Outbacker Perth antenna for HF plus a Diamond dual-band antenna for VHF/UHF. Vehicle is a 1998 Oldsmobile Bravada SUV. (Photo via KF3CD)

Starting Out Right

Two of the most important considerations for successful mobiling have always been securing a good power connection for the transceiver and ensuring a solid electrical ground connection for the antenna system. Indeed, the classic cigarette-lighter socket and mag-mount antenna arrangement is rapidly becoming outdated even for impromptu mobiling. That is because accessory wiring in many modern automobiles is so thin and wimpy that it is barely safe for powering a 5- or 10-watt rig. Also, an increasing number of new cars are being made with non-metal bodies. Mag mounts? No way! What to do?

Start with the power cable by routing a DC cable (like the one supplied with your transceiver or a replacement for it) from the battery to the interior mounting location for your rig. Often you can use a heavy screwdriver to force open the steering column's large rubber grommet just enough to admit the DC cable. As an alternative, you can snake it from the engine compartment, through a door seal, to the rig—but be extra careful to avoid crimping or cutting the cable over the long run. I routed my rig's DC cable through the door seal and diagonally across the rubber weather stripping of my 1996 Camaro eight years ago and it is still like new today, so this approach is "tried and proven."

Whether you use a trunk lip, frame strap, or giant alligator clip to mount your mobile antenna, make sure its coax feedline's shield and the mount's frame are electrically connected to the auto's metal frame. You may need to scrape a small area of paint from points where the mount's set screws fit against the body or frame.

When you are finished, check for good connections first between two known good frame points, second between the mount and the frame, and third between the coax cable's PL-259 shell (unplugged from your rig) and a front-seat bolt (which usually bolts to the vehicle's frame). In all three cases, total resistance should be less than one ohm. If resistance is higher, use your ohmmeter to track down the poor connections. This step is most important, so hunt diligently!

Next, and also very important, connect a ground jumper strap (possibly with alligator clips on each end for easy on/off use) between the grounded seat

Photo 2– Interior view of the KF3CD mobile setup. The Yaesu FT-100's main body is mounted in the SUV's rear area, and its head is remote-mounted on a swivel bracket stuck in an air-conditioning vent. A piece of gray foam matching the dashboard blocks air from the vent, and the whole kit-and-caboodle can be removed for restoring the dash to normal in only a minute.

*4100 S. Oates Street #906, Dothan, AL 36301
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Photo 3– This continuously active Pontiac mobile setup belongs to Don Wolfe, AA4VN, and consists of a Yaesu FT-100D, a Hi-Q motorized antenna, and a new W4RT Electronics Antenna Boss II controller. Using this 100-watt setup Don has worked 240 countries and 39 zones, plus he recently qualified for CQ's Worked All Counties award—all while mobile! (Photo via W4WB)

bolt and the ground lug/bolt on your transceiver.

After a few days of operation you may notice your antenna's bandwidth is more narrow than specified by its manufacturer. A base impedance matching coil or capacitor connected between the bottom ferrule of the antenna and the auto's ground, as suggested in most antenna installation instructions, works fine. I prefer a coil of five or six turns, 2.5 inches in diameter, experimentally tapped to ground for 40, 30, 20, 17, and 15 meters, but capacitors of 470 pFd for 40 meters, 330 pFd for 30 meters, or 220 pFd for 20 or 17 meters can also be used. Follow these "tried and proven" ideas and you will enjoy a rompin' good mobile signal!

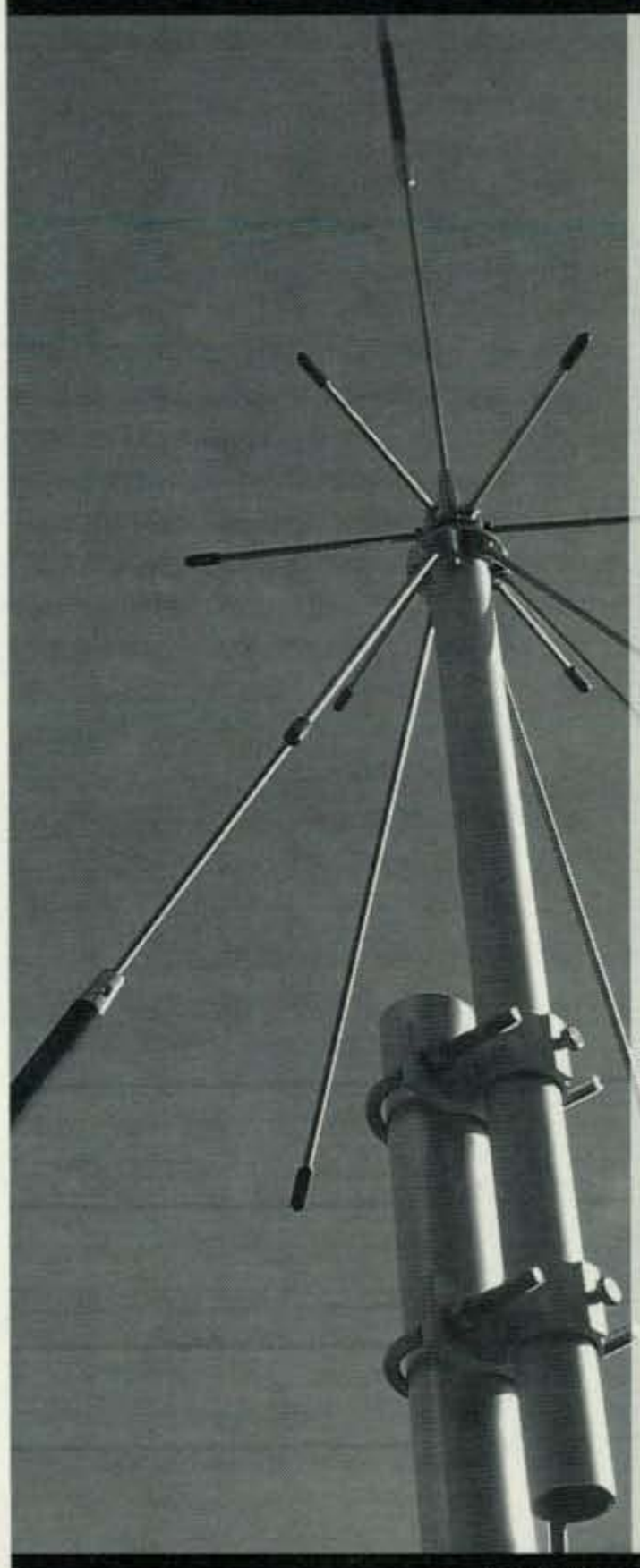
Hot New Goodies

From the creative workshop of W4RT Electronics comes news of two more new items for top-notch mobile and portable operations: the Antenna Boss II and the One Board Collins filter mod for the IC-703.

The Boss II is a multi-rig interface for mating today's hot mobile transceivers such as the ICOM IC-706, Kenwood TS-50, and Yaesu FT-100 with motorized or "screwdriver-type" antennas such as the Hi-Q, High Sierra, and Tarheel models. It connects between a transceiver's auto-tuner socket and the antenna's built-in motor (which drives the loading coil up or down to change bands and fine-tune for a low SWR). You set the Boss II's internal DIP switches according to your model of transceiver, maximum antenna tuning time and current, and it's ready to use. When you press the "tuner" button on your transceiver, the Boss II sets your rig to transmit at low power, applies tune voltage to the antenna, and monitors for a decreasing SWR. If you look back at your antenna during that tune time, you will see the movable coil section move at normal speed, then stop, reverse direction, and move at half-speed until it stops. Simultaneously the transceiver's SWR meter goes through minimum, then stops and returns to minimum right in sync with the antenna. The Boss II then remembers that last tune operation, so if you switch off the rig and later switch it back on and change bands, it is ready for action in a flash.

The One Board Filter mod for an IC-703 turns this inexpensive, low-power transceiver into a little romper by equipping it with the famous Collins mechanical filters for CW, SSB, or both modes of operation. If you are electronically

Enjoy Super Wideband Coverage with the new DS3000A Discone Antenna!



Maximize the operation of newer receivers capturing signals of 2 GHz or more with the DS3000A from AOR. Receives from 75 MHz to 3 GHz and is perfect for multiband transmitters. By replacing multiple antennas and feed lines, the DS3000A simplifies ham radio operations. Built to precision standards; its relatively small size (only 2.9 feet high) and light weight (just 1.55 pounds) present a small wind load. Can be mounted in confined areas. The DS3000A supports transmitting on 144, 430, 904 and 1200 MHZ, safely handling loads up to 50 watts. The DS3000A antenna system includes mounting hardware for standard masts and 33.8 feet of low-loss RG58A/U cable terminated in a Type N connector.

DS3000A is another example of why AOR stands for Authority On Radio Communications!

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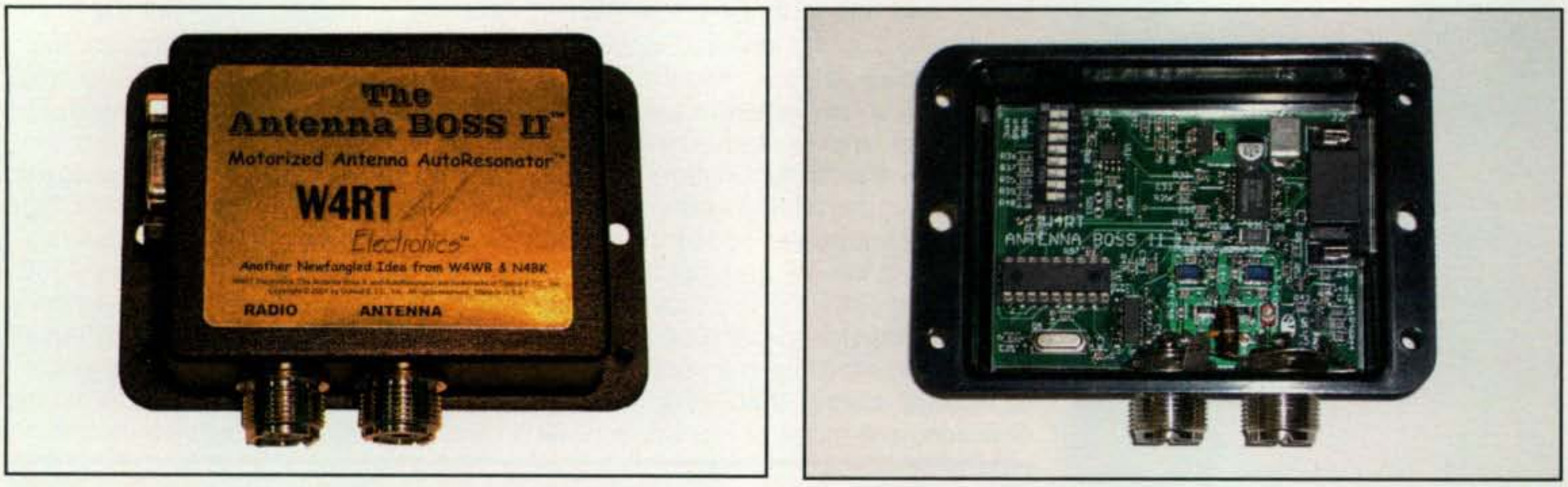

Photo 4– External (left) and internal (right) views of the new Antenna Boss II from W4RT Electronics. The tidy little unit interfaces Kenwood, Yaesu, and ICOM transceivers with High Sierra, Hi-Q, and Tarheel motorized antennas for automatic bandswitching and deluxe mobiling. (Photo via W4WB)

astute you can home-install the filter(s). As an alternative, W4RT can perform the mod for you. After installation, calling up the narrow CW filter gives a steep-skirted bandwidth of 500 Hz. If the SSB filter is installed, its bandwidth is 2300 Hz—also with nice steep skirts. Together the filters really upgrade an IC-703. More details on the Boss II and One Board Filter mod are available at <www.w4rt.com>. Check them out!

Our next highlighted item has been available for several months, but you may not have seen it. The little gem gives such a big improvement in the audio quality of a mobile signal that it warrants additional compliments. I am referring to the new Heil Handi-Mic for use with Kenwood, ICOM, and Yaesu transceivers. The Handi-Mic is half the size of a Goldline mic, it has a snap-action PTT button on its side, and it can be ordered with a Heil HC-5 full-range element, HC-4 DX element, a custom IC element for ICOMs, or a baby Goldline element for pro use. How well does it work, you ask? As a personal opinion, I have always found an ICOM IC-706 to be one of the most "generic sounding" transceivers on the air—until I heard one with a Heil Handi-Mic. It absolutely blew me away with beautiful audio. It was incredible. I never thought a mic—any mic—could make any rig sound so good. Wow! Handi-Mics are available from Bob Heil and friends at Heil Sound Ltd., 5800 North Illinois, Fairview Heights, IL 62208; telephone 618-257-3000 or <www.heilsound. com>. Get one and sound great!

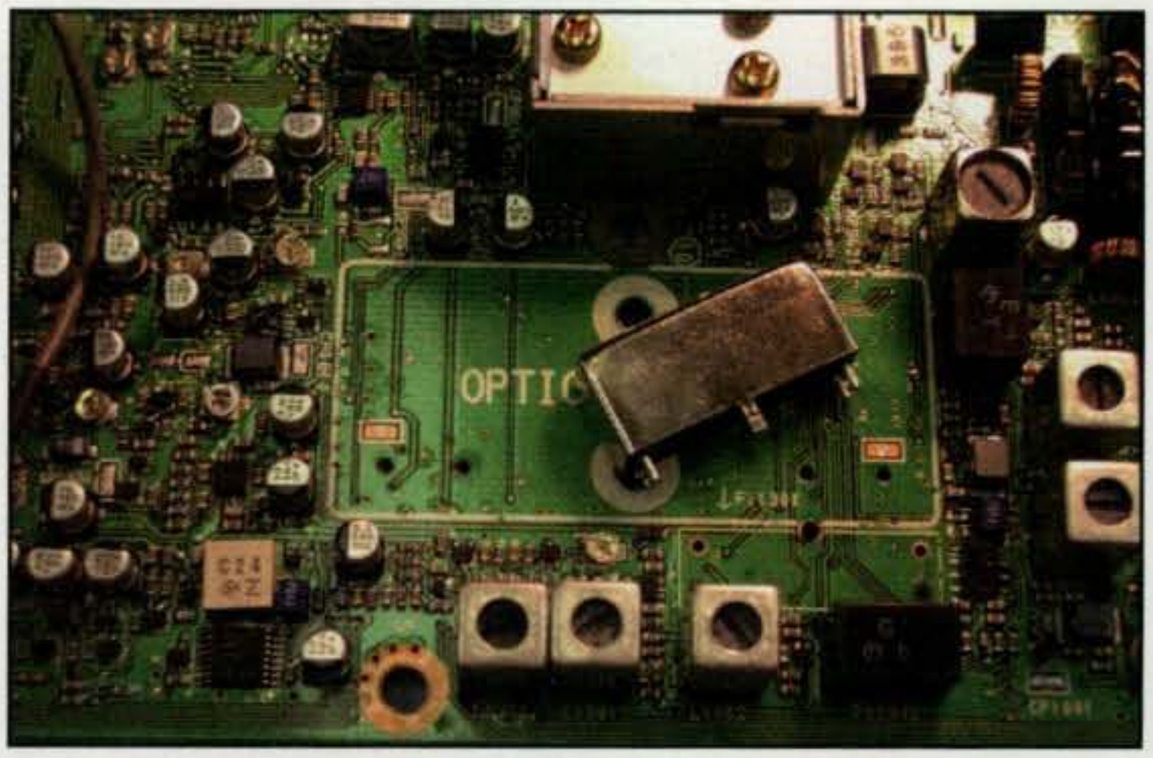

Photo 5– Internal view of an IC-703's main circuit board with its standard Murate filter removed and ready for upgrading with the new One Board dual filter from W4RT Electronics. (Photo courtesy Barry Johnson, W4WB)

Super VHF Antenna

Even with today's increasing interest in HF mobiling, VHF activities continue to hold a slight edge in overall popularity, and many amateurs are also still hunting for that ideal 2-meter antenna. Such an item may not exist, but Jerry Bustin, KR7KZ, is making the closest thing to it I have seen. It is a $^{5}/_{8}$-wave, or 48-inch tall, J pole that bolts into a regular mobile antenna's $^{3}/_{8} \times 24$ screw hole, has an SO-239 socket for connecting a coax cable, and exhibits good signal gain during use. Most significant, however, is the fact the J pole does not require a ground connection or any form of grounding for superb operation. That means it works like a champ on metal- and composite-body autos alike; on bicycles, fiberglass boats, brick chimneys; and even on a wood pole stuck in the sand at the beach. Lean the pole and antenna over at a 45-degree angle and the setup also makes a good OSCAR satellite antenna.

I use one of the KR7KZ J poles for both 2-meter mobiling and operating portable and find it consistently outworks my other antennas by a noticeable margin. I have asked Jerry

Photo 6– Mod completed! Collins famous mechanical filters, one with a 500 Hz width for CW and one with a 2300 Hz width for SSB, have been installed in the IC-703's "optional filter" position. (Photo courtesy W4WB)

Photo 7– Would you like to command the best-sounding mobile signal on the band? Connect a new Heil Handi-Mic to your transceiver and tweak its transmit audio equalized to enhance your voice, and you will be the envy of the crowd—any crowd! (Discussion in text.)

to make one I can use for 30-meter mobiling, but he just keeps telling me a 35-foot tall antenna on a Camaro isn't too feasible. Maybe he is right, but if it worked like his 2-meter J pole, it would be a killer!

While recently talking with Jerry, I learned that his plans for mass producing the J pole have been postponed, but he is still making them one at a time in his workshop. He makes them in 2-meter and 2-meter/70-cm versions and in stainless steel or a sleek black finish according to what you order. If you, too, would like one of these super J poles, contact Jerry Bustin, KR7KZ, at P.O. Box 888, Granger, WA 98932; telephone 509-430-1062 or on the web at <www.qrz.com/KR7KZ>.

Photo 8– The KR7KZ 2-meter J pole ground-independent antenna is ideal for mobiling with anything from a composite-body automobile (such as my dear little Camaro) to a bicycle or fiberglass boat. It is easy to install, looks good, and works great. The antenna is available from KR7KZ.

Conclusion

We have again filled allotted column space and must sign off! The pleasures of operating mobile and portable continue, however, so stay focused on the fun and here's hoping we QSO mobile to mobile during the warm days of this month!

73, Dave, K4TWJ

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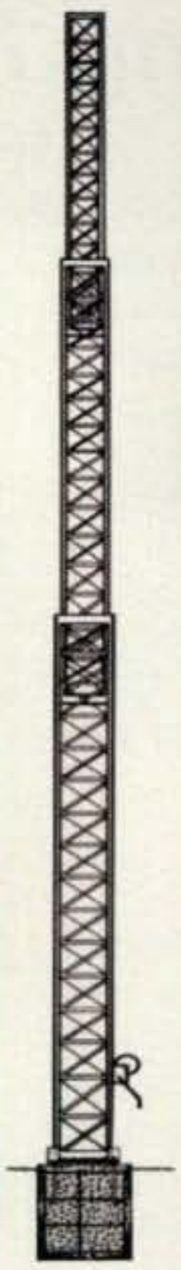

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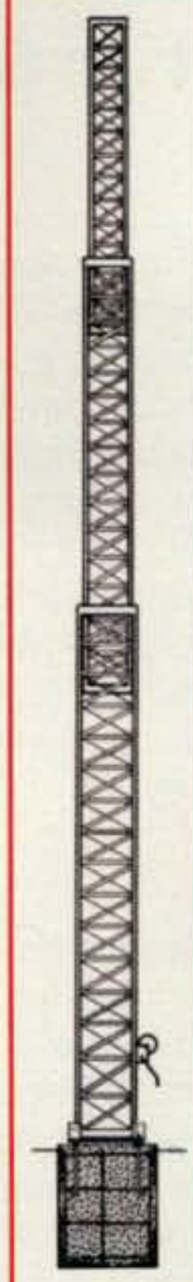
TX-489MDPL	89'	23'4"	1800	$9,034	$8,239



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• MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

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HDX-589MDPL	89'	23'8"	2440	$10,841	$9,899
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• MDP models include motor drive.

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MA-770	71'	22'10"	645	15.5	5.5	$3,091	$2,799
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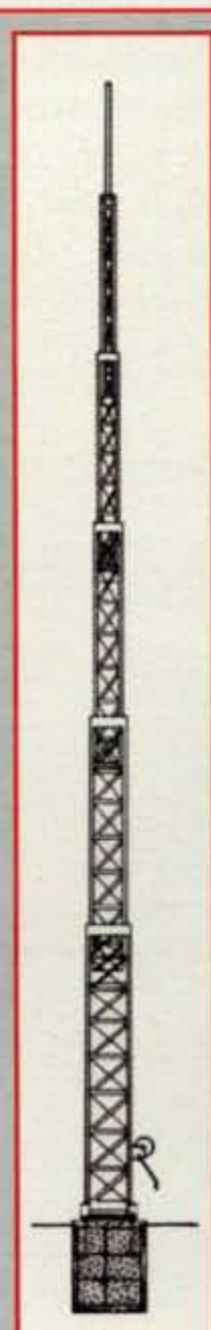
MA-850MDP	85'	23'6"	1128	15.3	6.3	$6,591	$5,999



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• All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8' steel mast, top plate, and rotor plate.

• Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

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TMM-433HD	33'	11'4"	400	$1,970	$1,789
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beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Taking Ham Radio on the Road—More Than Going Mobile

As the weather turns warmer, most of us tend to move things to do outside. The cold and wet (or even icy) winters are gone, and it's time to enjoy the fresh air and sunshine. You probably have just finished operating Field Day, and you may feel the desire to operate more often out in the field. If you missed that great disaster-preparedness drill, you can still experience some of the excitement by setting up your own portable operation. This month let's take a look at taking your ham radio gear on the road—out of your house, into the mobile and beyond.

Stay Safe

Whatever you decide to do, always remember that in order to make things fun, things must be safe. While you are "out there," remember that you will need to prepare for the weather. Bring along liquids to make sure you do not dehydrate (remember, alcohol and caffeine are diuretics), and use sunscreen to protect your skin from burning. Establish your operating position in a shady spot so you can stay cool and get a break from the sun. A lot of vehicles have tailgates that are hinged at the top so that the door swings upward, making a nice roof. A tarp and bungee cords or ropes can be used to extend the shade, lean-to style.

With vehicular operations, do not allow the power and antenna cables to get in the way of the steering wheel and pedals. Fasten the rig securely in some way so that acceleration and braking will not make the rig become a flying object. Preprogram the memory channels and get to know your radio well enough to operate it blind-folded, so you will not need to take your eyes off the road while operating. If you need to do something complicated on your radio, wait until you can safely pull off the road, and make sure that you are well off the road and onto the shoulder to be safe. Also, when I say "be safe," do not forget that many road shoulders are not in good condition; make sure that you choose a spot that will let you get back onto the road safely. In addition, do not forget proper fusing of all power leads and include protection against chafing wires. Use rubber grommets and make holes large enough to accommodate the wires with enough room to move.

Since most cars effectively shield at least some of your signals, it would be best if you had some sort of antenna on the outside of your vehicle. You will have to figure out whether you want your mobile antenna system to be "temporary" or "permanent." In this case, temporary means "Do I want to be able to remove the antenna later?" and permanent means "Do I want to drill holes in my vehicle?"

There are varying degrees of permanence and many mobile-antenna mounting methods, including magnetic, on-glass, gutter-clip, trunk-lid, and an amazing array of others. Check with your favorite ham radio dealer and take a look at the ads in this magazine for ideas. A magnet-mount antenna is one of the fastest and easiest systems

*16428 Camino Canada Lane, Huntington Beach, CA 92649
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Photo 1– Here is a peek inside Peter Shores' communications van. AD6TN's vehicle is really a well-equipped ham station on wheels, ready to cover the ham as well as commercial bands from HF to UHF. (Photos by the author)

Photo 2– Here is my Honda Prelude with a 6-meter loop installed on the bike and ski rack. This simple setup has allowed some amazing contacts on 6 meters.

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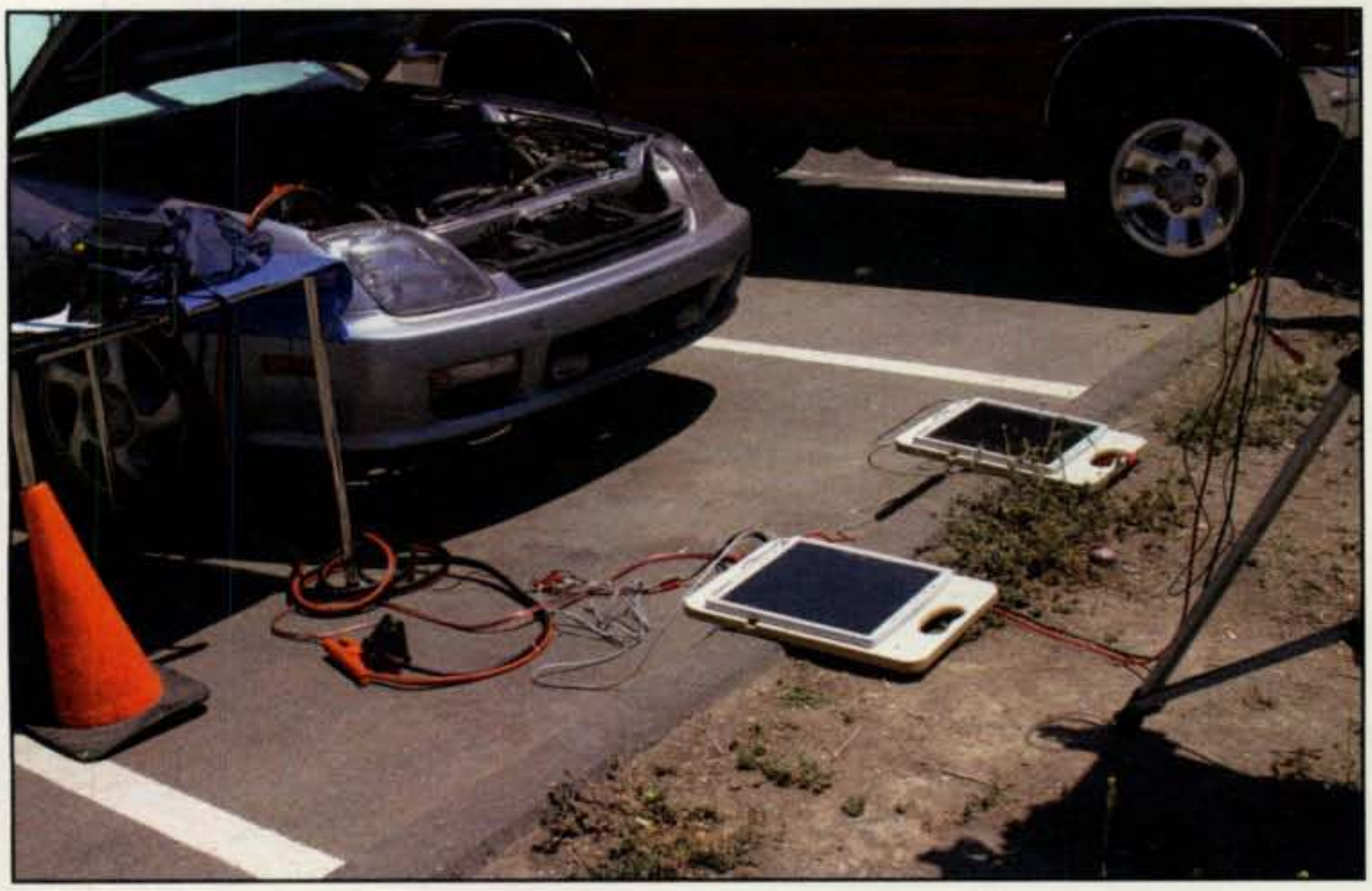

Photo 3– When operating your station in a parked car, it may be very wise to have a way to charge your car battery (if you're using it to power your radio). Solar panels are pollution-free and can prevent your trip being ruined by keeping your battery charged for starting your vehicle.

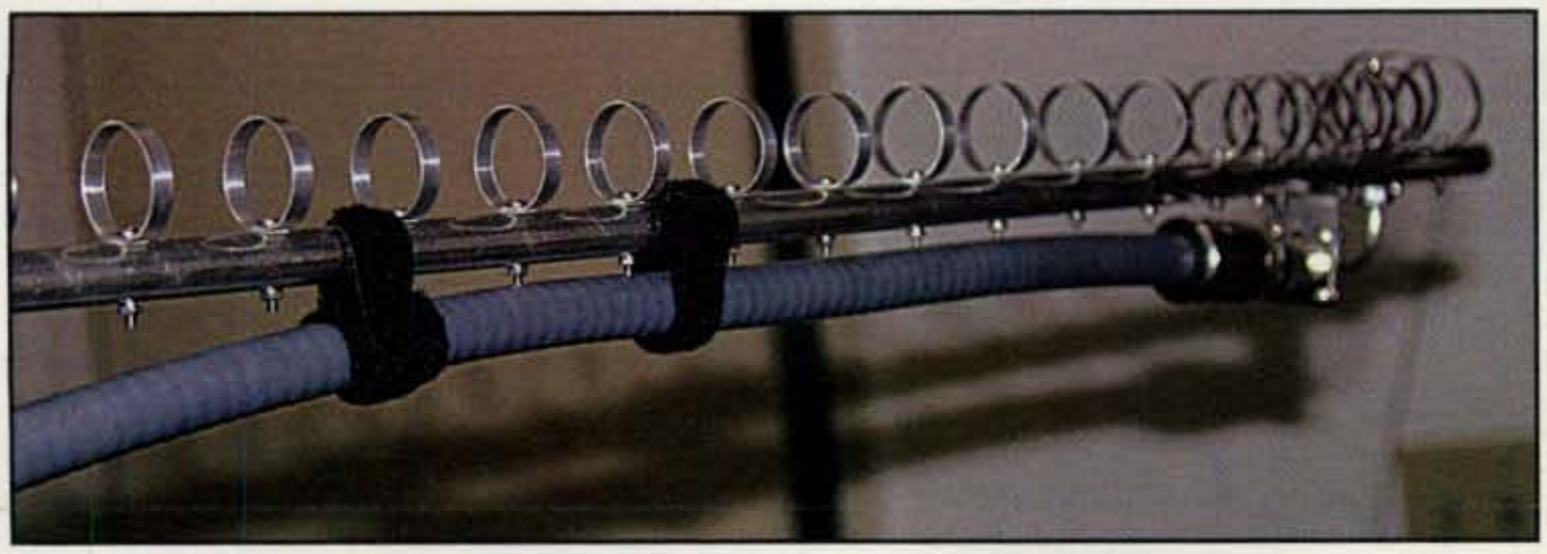

Photo 4– By changing hardware, just about any "base station" antenna can be made more convenient for portable operations. Here hook-and-loop straps replace electrical tape to temporarily but securely hold the feedline in place along the boom.

available, and it's performance is not too bad. Another is the trunk-lid mount.

The easiest way to increase any kind of fun is by keeping things simple. By keeping your portable and mobile installations simple, your station can be made ready to go in a shorter amount of time. This can be a requirement in an emergency situation, for which we all should continuously prepare.

Mobile and More

Any vehicle with a ham radio installation can be called a "mobile station." Duh. Thus, if you have the proper radio and antenna combinations for the bands in which you are interested, you can just find a nice place to park, preferably on the top of a hill, near the shoreline, or at some other "radio optimum" location.[1] Then turn on your radio and tune around to find stations to work! Just don't forget to start the engine every now and then to make sure your battery remains charged. Bring a booster battery (available from hardware, automotive, or home centers) just in case you drain your battery too low to start the car. Attaching a meter to measure battery voltage is a good idea.

For a look at a very well-equipped mobile station, check out at what Peter Shores, AD6TN, has put together for his communications van (photo 1). The van is equipped to work just about all bands and modes from low-band HF to UHF.

What happens if you drive a small sedan or sports car, like I do? A station can still be assembled with a few adjustments to accommodate the radio gear in any available space in (or on) your particular vehicle. One alternative is the "stationary mobile portable station."

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Since my car is not as roomy as Peter's van, I use a small picnic table and set up radios, rather than lunch, on the table (see photo 2).

This simple stationary mobile station is set up for 6 meters. It consists of a small all-band, all-mode mobile radio, loop antenna, picnic table, and not much else. It takes only a few minutes to deploy, and I can get on the air almost immediately. When it is time to leave, everything can be stowed in a few moments.

Power is taken from the vehicle battery, which is indeed risky, since you may kill the battery and not be able to start your vehicle. Solar panels can be used to keep the battery "topped off" during the daytime (see photo 3). I got the panels from a local marine-hardware store. Other sources for solar panels and accessories include recreational vehicle (RV), automotive, hardware, and discount houses. A simple search on the internet or in your phone book should lead you to several places to get these very useful battery-savers.

While operating stationary mobile, make sure no one can come into contact with antenna elements or wire antennas, and "flag" guy lines or ropes so that people can see them. Better yet, arrange any guy wires so that no one can walk into them. Even better, keep your portable antenna small and make the mast strong enough to survive without guy lines.

Improvements

A simple station such as this leaves a lot of room for improvement. This can be done in stages, as your radio budget allows. Probably one of the first things to upgrade would be your antenna system, and one easy path is to take a "base station" antenna and make it portable by making some simple modifications.

Photo 5– Wing nuts replace hex nuts on the boom-to-mast bracket. Now the antenna can be set up and taken down without tools.

"Portable-izing" to simplify transporting, setting up, and tearing down a large antenna sometimes can be accomplished just by changing hardware to more convenient and easier-to-handle fasteners (photos 4 and 5). In this case, my loop Yagi (a beam antenna with loop, rather than straight elements) for 3456 MHz is being prepared for field use. Wing nuts replace most hex-nut fasteners, so a wrench is not needed. The feedline (Andrew 1/2-inch HELIAX®) is held to the boom with hook-and-loop straps. The antenna is only partially disassembled when transporting to save time setting up and tearing down. These ideas can be used with any antenna, including multi-band verticals and beams.

Portable tripods and antenna masts can be found on eBay and other sources. Check the advertisers in this magazine, and do an internet search for similar portable antenna support units.

Taking your radio on the road can be an exciting addition to your "Are we there yet?" driving adventures. Of course, always remember that sometimes there are other things in life besides making ham radio contacts. Therefore, if the fish are biting, consider putting the radio away, and reel in a few trout instead!

73, Wayne, KH6WZ

Note

1. If you operate on private property, be sure to get permission ahead of time from the property owner. In addition, in these security-conscious times many public places require a permit if you are going to be setting up anything outside your car. Check with proper authorities before you go, and use common sense.

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From QST Magazine, March, 2005

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Regulating Amateur Radio by Bandwidth rather than Mode

ARRL petition seeks the flexibility to experiment with new digital transmission methods

BY FREDERICK O. MAIA,* W5YI

"The regulation of emission modes in Amateur Radio Service allocations is a limiting factor with respect to Amateur Radio experimentation. It leads to attempts to put new technology into a regulatory framework that was designed only to deal with older analog emissions. The conversion to segmentation by bandwidth provides a suitable regulatory environment for the transition to newer technologies. There are emission types that do not necessarily fall neatly into a sub-band division by maximum bandwidth, such as DSB AM, but that should continue to be accommodated." —from early draft of an ARRL-proposed Petition for Rulemaking.

The American Radio Relay League is giving radio amateurs one last chance to express their opinions on its proposal to regulate the ham bands by bandwidth instead of by emission type before formally submitting the proposal to the FCC. Take note of the fact that the bandwidth proposal was amended somewhat at a recent meeting of the League's Executive Committee. The bandwidth concept was originally approved by the ARRL Board of Directors three years ago. It will be finalized at the July 2005 ARRL Board meeting and a Petition for Rulemaking will be developed and filed.

The ARRL was guided by advice from an Ad Hoc Digital Committee formed to advise on issues that arise from the development of new high-frequency digital data modes of operation. Its main objective was to provide for emerging higher speed digital modes in the amateur bands between 1.8 and 450 MHz while preserving an amateur's prerogative to use traditional modes.

The committee identified three nominal bandwidths for amateur transmissions in the HF bands: 200 and 500 Hertz . . . and 3 kilohertz. The committee also felt that amateur radio should embrace internet technology and take every advantage of what it has to offer in order to extend and improve the value of our hobby. Judging from recent comments on various amateur forums, it is apparent that not everyone agrees.

Conversion to a bandwidth regulatory system was attempted in 1977 and again in the mid-1980s, but the proposed changes met with opposition from certain segments of the amateur population. As a result, we have the outdated and hard-to-interpret rules of today. For example, digital voice is really both phone and data. Do we transmit digital voice emissions in the phone bands (it is voice) or in the non-phone segments (since all digital transmissions are also data)?

In July 2002 the Board adopted a "statement of principle" that the ARRL would ask the FCC to regulate subbands in the future by bandwidth instead of by mode. There were many details to be worked out before a petition could be submitted. The driving force was the realization that the existing rules, written in the days of mechanical teletype, were not suited to regulating future digital modes.

"The regulation of emission modes in Amateur Radio Service allocations is a limiting factor with respect to Amateur Radio experimentation," the ARRL said. "It leads to attempts to put new technology into a regulatory framework that was designed only to deal with older analog emissions.

"The simplest means of streamlining the Commission's rules, while at the same time providing maximum flexibility for the incorporation of new digital communications looking forward to the next decade, is to provide for band segmentation by bandwidth rather than by emission mode in the Part 97 Rules."

What is Being Proposed?

A draft petition prepared in 2003 has been refined several times by the ARRL Executive Committee and by Board members, most recently at an April 2005 meeting in Denver. The League says care has been exercised to avoid any reduction of choices of emissions that could be used by existing licensees.

The ARRL noted that RTTY and data emissions currently are permitted by FCC rule throughout the HF "CW subbands," but due to to a "gentlemen's agreement" they generally are not used in the CW portions. The proposed rules would limit bandwidth in these "CW subbands" to 200 Hz. Bandwidth in the existing "RTTY/data subbands" would be limited by rule to either 500 Hz or 3 kHz.

The proposed bandwidths and uses are 200 Hz (CW, PSK31), 500 Hz (RTTY/data), 2.8 kHz (60 meters only), 3 kHz (SSB and digital telephony, image, high-speed data, and multi-media), 6 kHz (ISB, Independent Sideband[1]), 9 kHz (DSB-AM), and 16 kHz (FM.)

There would be no bandwidth limits in the ham bands above 222 MHz; in the League's proposal, the only limitation above 1.25 meters would be that all amateur radio signals must be confined within the band. Amateurs would not be required to be able to measure the bandwidth of their signals.

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SS-18	15	18	1⅞ x 6 x 9	3.6
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SS-30	25	30	3¾ x 7 x 9⅝	5.0

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SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
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SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
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*ICS – Intermittent Communication Service

Updated Band-by-Band Proposal (April 2005)

160 meters	1800–2000 kHz	Maximum bandwidth: 3 kHz is proposed (Double sideband AM phone limited to 9 kHz; Independent sideband transmissions limited to 6 kHz)
75/80 meters	3.500–3.580 MHz	Maximum bandwidth: 200 Hz
	3.580–3.620 MHz	Maximum bandwidth: 500 Hz
	3.620–3.635 MHz	Maximum bandwidth: 3 kHz (With automatic control)
	3.635–4.000 MHz	Maximum bandwidth: 3 kHz (Novice or Technician Class operator license may only transmit CW using the international Morse code.)
60 meters	5.1675 MHz	Maximum bandwidth: 2.8 kHz (§97.401(c) allows emergency communications in Alaska.
	5.332, 5.348, 5.368, 5.373, & 5.405 MHz	Maximum bandwidth: 2.8 kHz (Upper-sideband, USB, phone only, 50 watts maximum)
40 meters	7.000–7.035 MHz	Maximum bandwidth: 200 Hz
	7.035–7.100 MHz	Maximum bandwidth: 500 Hz
	7.100–7.105 MHz	Maximum bandwidth: 3 kHz (With automatic control)
	7.105–7.300 MHz	Maximum bandwidth: 3 kHz (Novice or Technician Class operator license may only transmit CW using the international Morse code. Double sideband AM phone limited to 9 kHz, Independent sideband transmissions limited to 6 kHz.)
30 meters	10.100–10.120 MHz	Maximum bandwidth: 200 Hz
	10.120–10.135 MHz	Maximum bandwidth: 500 Hz
	10.135–10.140 MHz	Maximum bandwidth: 3 kHz
	10.140–10.150 MHz	Maximum bandwidth: 3 kHz (With automatic control)
20 meters	14.000–14.065 MHz	Maximum bandwidth: 200 Hz
	14.065–14.100 MHz	Maximum bandwidth: 500 Hz
	14.100–14.112 MHz	Maximum bandwidth: 3 kHz (With automatic control)
	14.112–14.350 MHz	Maximum bandwidth: 3 kHz (Double sideband AM phone limited to 9 kHz; Independent sideband transmissions limited to 6 kH.)
17 meters	18.068–18.100 MHz	Maximum bandwidth: 200 Hz
	18.100–18.110 MHz	Maximum bandwidth: 500 Hz
	18.110–18.168 MHz	Maximum bandwidth: 3 kHz (Double sideband AM phone limited to 9 kHz; Independent sideband transmissions limited to 6 kHz)
15 meters	21.000–21.080 MHz	Maximum bandwidth: 200 Hz.
	21.080–21.150 MHz	Maximum bandwidth: 500 kHz
	21.150–21.160 MHz	Maximum bandwidth: 3 kHz (With automatic control)
	21.160–21.450 MHz	Maximum bandwidth: 3 kHz (Novice or Technician Class operator license may only transmit CW using the international Morse code. Double sideband AM phone limited to 9 kHz, Independent sideband transmissions limited to 6 kHz.)
12 meters	24.890–24.920 MHz	Maximum bandwidth: 200 Hz
	24.920–24.930 MHz	Maximum bandwidth: 500 Hz
	24.930–24.990 MHz	Maximum bandwidth: 3 kHz (Double sideband AM phone limited to 9 kHz, Independent sideband transmissions limited to 6 kHz)
10 meters	28.000–28.050 MHz	Maximum bandwidth: 200 Hz
	28.050–28.120 MHz	Maximum bandwidth: 500 Hz
	28.120–28.189 MHz	Maximum bandwidth: 3 kHz (With automatic control)
	28.189–29.000 MHz	Maximum bandwidth: 3 kHz.
	29.000–29.700 MHz	Maximum bandwidth: 16 kHz (Double sideband AM phone limited to 9 kHz, Independent sideband transmissions limited to 6 kHz. A Novice Class operator may only transmit CW using the international Morse code, data, or phone emissions J3E and R3E.)
6 meters	50.0–50.1 MHz	Maximum bandwidth: 200 Hz
	50.1–50.3 MHz	Maximum bandwidth: 3 kHz
	50.3–54.0 MHz	Maximum bandwidth: 100 kHz
2 meters	144.0–144.1 MHz	Maximum bandwidth: 200 Hz
	144.1–144.3 MHz	Maximum bandwidth: 3 kHz
	144.3–148.0 MHz	Maximum bandwidth: 100 kHz
1.25 meters	219–220 MHz	Maximum bandwidth: 100 kHz
	222–225 MHz.	Maximum bandwidth: — (No specific bandwidth limitations apply. All emissions must be within the allocated band.)

Balance of Amateur Bands
No specific bandwidth limitations will apply to the 70 cm, 33 cm, 23 cm, 13 cm, 9 cm, 5 cm, 3 cm, 1.2 cm, 6 mm, 4 mm, 2.5 mm, 1 mm bands, and all spectrum above 300 GHz. The only requirement is that all emissions must be confined within the allocated band.

Table I– Here is a recap of the most recent ARRL recommendations for maximum bandwidth limits to be set by FCC rule. Any additional subdivisions and limitations would be determined by band planning. These recommendations will form the basis for the Executive Committee's report to the ARRL Board for its July meeting.

Late Developments

Last fall the ARRL's Executive Committee recommended an additional segment for 3-kHz bandwidth at 10.135–10.150 MHz to accommodate existing and planned future digital operations. It also proposed a Part 97 Rule change to clarify that FCC-licensed amateur stations may use any published digital code as long as other rules are observed.

On April 9th the ARRL Executive Committee reached a consensus on its recommendations to the ARRL Board of Directors for a regulation-by-bandwidth proposal (see Table I). It will form the basis of a petition to the FCC seeking to govern the usage of amateur spectrum by emission bandwidth rather than by mode. The rules changes to be requested must stand the test of time over at least the next five to ten years.

It was agreed that semi-automatic operation (with a control operator required to be on duty at one of the two stations in communication) would be permitted throughout the bands, with management of interference through a combination of technology and respectful operating practices. Fully automatic control would be permitted only in certain narrow HF subbands.

The Executive Committee recommendations are likely to generate considerable discussion between now and the July board meeting. There is strident opposition popping up on ham radio internet chat pages and on the air, mostly focused on the interference potential from semi-automatic "robot" stations running WinLink, which, under the League plan, would be allowed to operate anywhere in the current voice bands. Additional concerns are being voiced by users of "hi-fi" SSB modes, whose signals are broader than 3 kHz but not as broad as a full-carrier AM signal, which would be "grandfathered" under the ARRL proposal, while modes such as Extended SSB (ESSB) would be prohibited. Frequently Asked Questions (FAQs) on the Executive Committee recommendations are available on the ARRL website. Amateurs should direct their comments on these proposals to the League via e-mail: <bandwidth@arrl.org>.

73, Fred, W5YI

Note

1 Independent Sideband (ISB) is a modulation method that puts different information on each sideband of a double sideband (DSB) signal. It has been used in amateur slow-scan TV to transmit image information on one sideband and voice on the other.

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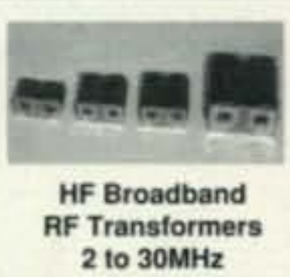

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BY BOB JOSUWEIT,* WA3PZO

It's Hurricane Time Again

Last year's Northern Atlantic Basin hurricane season began with the formation of Alex in late July and ended with six out of nine hurricanes becoming major category three or higher storms on the Saffir-Simpson Hurricane Scale. The strongest was Hurricane Ivan, which reached category five status.

This month we'll cover some hams who were honored by the National Weather Service for their work during the hurricanes that hit Florida last year. We'll also look at what lies ahead for this year's hurricane season and the way weather information might be provided to the public.

Navy Vice Admiral Conrad Lautenbacher, Jr., Ph.D., Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator, says the award winners "set a perfect example for others to follow in their communities." (Photo courtesy of NOAA)

Alex the First

Alex originated from a low-pressure area and became a tropical depression off of the northeast Florida coast on July 31. According to the National Hurricane Center, it drifted erratically for two days. Alex became a hurricane on August 3, and the center passed within 10 miles of Cape Hatteras, North Carolina with maximum winds near 100 mph. By August 5 it was passing a few hundred miles south of the Canadian Maritimes. The rip currents associated with the storm resulted in one death off Nags Head, NC with damage less than $5 million.

The year continued with Charley, Frances, Gaston, Ivan, and Jeanne striking the United States. Charley also hit western Cuba, while Frances and Jeanne hit the Bahamas. Hurricane Ivan hit Grenada, and rain from Jeanne killed thousands in Haiti. In all more than 3000 people lost their lives last year as a result of hurricane-related weather conditions. Property damage in the United States was estimated at more than $42 billion, making 2004 the costliest hurricane season on record. The National Hurricane Center said the second and third costliest individual hurricanes were Charley and Ivan. *(For detailed coverage of ham radio's response to these storms, see the "Public Service" column in the November and December 2004 issues of* CQ.*—ed.)*

NOAA Awards Hams

The National Oceanic and Atmospheric Administration presented its Environmental Hero Award this year to 34 individuals and three organizations from across the United States and around the world, including three hams from Florida. Given in conjunction with Earth Day celebrations this past spring, the award honors NOAA volunteers for their "tireless efforts to preserve and protect our nation's environment."

"NOAA and the nation are fortunate to have such dedicated people volunteer so much of their time," said retired Navy Vice Admiral Conrad Lautenbacher, Jr., Ph.D., Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator. "They set a perfect example for others to follow in their communities. America needs more environmental heroes like them."

*c/o CQ magazine
e-mail: <wa3pzo@cq-amateur-radio.com>

Bob Stanhope, W3RMS, Paul Toth, NA4AR, and Sean Fleeman, N4SCF, received Environmental Hero Awards. Sean Bennett, Meteorologist in Charge, National Weather Service office, Ruskin, Florida (Tampa Bay), and Bill Proenza, Southern Region Director, National Weather Service, presented the awards. Shown from left to right are Sean Bennett, W3RMS, NA4AR, N4SCF, and Bill Proenza. (Photo courtesy of W3RMS)

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Established in 1996, the Environmental Hero award is presented to individuals and organizations that volunteer their time and energy to help NOAA carry out its mission.

"On behalf of the 12,500 men and women working for NOAA, I am pleased to present you with this 2005 Environmental Hero Award," Lautenbacher wrote in a letter to the recipients. "Your dedicated efforts and outstanding accomplishments greatly benefit the environment and make our nation a better place for all Americans." There are a total of 37 winners—34 individuals (three posthumous) and three organizations.

Among the recipients of this award were three ham radio operators from Florida: Sean Fleeman, N4SCF, New Port Richey; Skywarn Program Director Paul Toth, NA4AR, Seminole; and Bob Stanhope, W3RMS, Valrico. According to Lautenbacher, these hams "contributed to saving life and property in Florida during Hurricanes Charley and Frances as amateur radio net control operators for the NOAA National Weather Service Tampa Bay Area. They gave up time with their families to gather real-time reports during the hurricanes to enhance NWS warnings and also provided up-to-the-minute weather information for recovery operations in west central and southwest Florida.

Only a Volunteer?

CQ spoke with Bob Stanhope, W3RMS, who explained the scope and intensity of the hams' work during the hurricanes. "Charlie did the most damage as it entered the state at Punta Gorda just north of Fort Myers," said Stanhope. It cut a path through the central area of Orlando and entered the Atlantic Ocean at Ormond Beach, just north of Daytona. "At one point we were tracking 13 suspected tornadoes. We manned WX4TBW for a week! We helped coordinate movement of emergency relief supplies and gave storm warnings to rescue efforts."

Stanhope also told *CQ*, "We are in the tropics, and as such it's normal to have tropical thunderstorms during the summer. We have so many severe storms that it's a common occurrence. There may be 30 to 40 strong thunderstorms in Florida at any given time. The rescue efforts needed to be alerted to these storms, as they were in makeshift tents and they only had portable towers and antennas erected. All power in the area was by portable generator. As usual, the government emergency communications were splintered. They couldn't communicate with each other. The only common communications was Nextel phones and amateur radio. Well, there were 113 Nextel towers and antenna installations erased from the face of Florida by Charlie alone, and two more hurricanes on the horizon. The other cell phone services weren't any better off." Each operator put in about 125 hours during the three storms.

Frances made landfall from the Atlantic at Fort Pierce, raced through the Orlando area, and entered the Gulf of Mexico at Crystal River, west of Ocala. This storm produced the most rain there, dumping 11 inches at Stanhope's home. The rivers were already near flood stage, recovering from Charlie. It was getting desperate.

Then came Jeanne, entering from the Atlantic between Jupiter and Palm Beach Gardens, racing through the Orlando area, and then running up the entire length of the west coast into Alabama.

"The eye wall of Jeanne went over Valrico," said Stanhope, "and was something to experience. Jeanne finished off the rivers and streams as well. The flooding was total, with many streams over their banks by 8 to 13 feet. We personally experienced 3 minutes of winds at 110 miles per hour, losing the top 12 to 15 feet of our maple and

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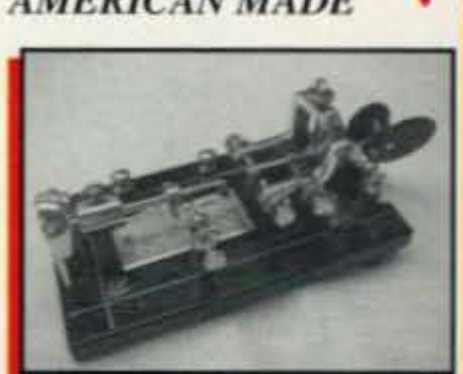

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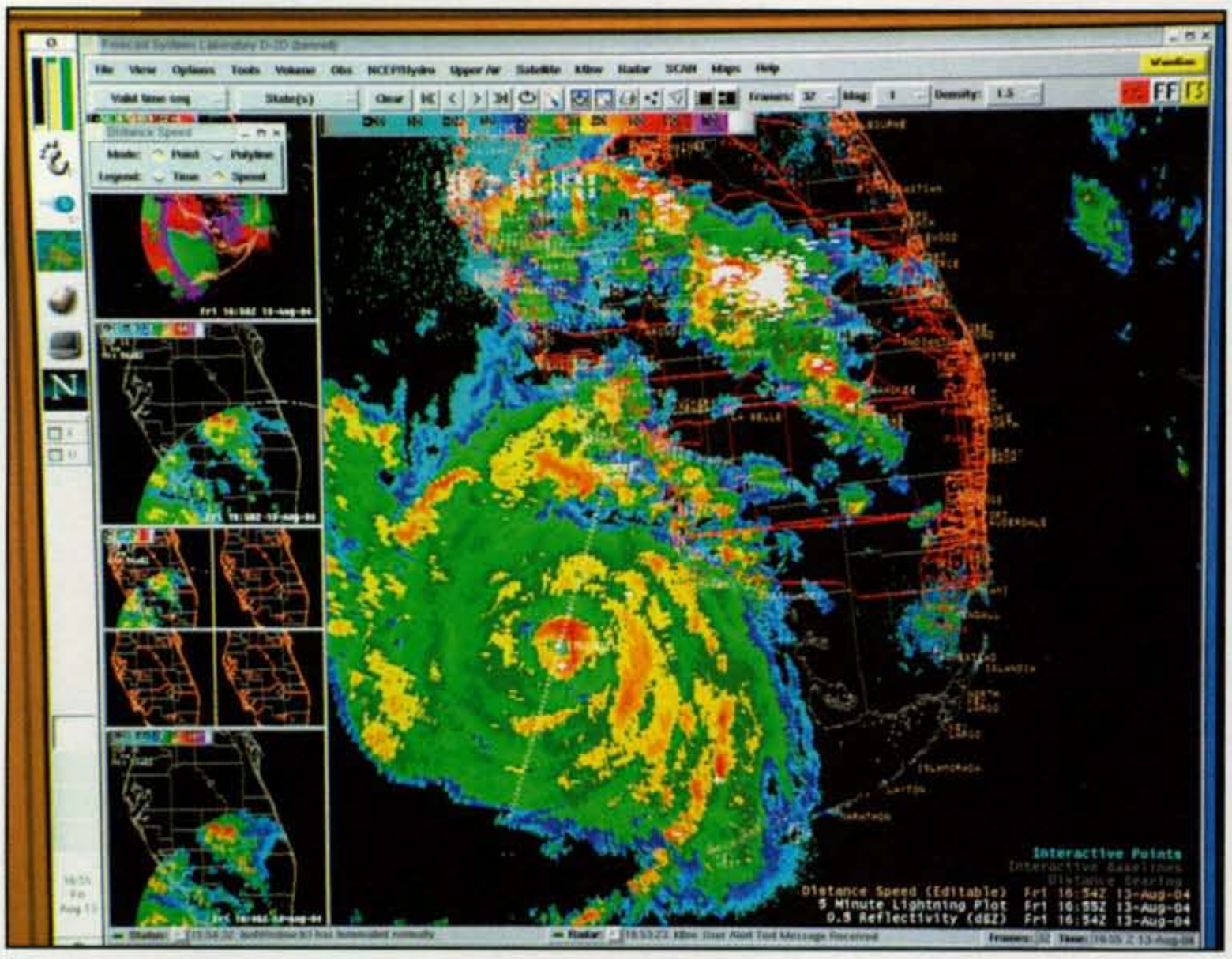


Hurricane Charlie turns eastward towards Punta Gorda. Had it headed directly to Tampa Bay and its 2 million residents, the effects would have been catastrophic. (Photo courtesy of W3RMS)

oak trees. Everyone in our neighborhood had debris stacked up 6 to 8 feet high. They took it out with front loaders and dump trucks. Jeanne made you respect horizontal rain."

We asked Stanhope what central Florida looked like in May 2005. He said, "In central Florida, where all three hurricanes crossed within about 30 miles of each other, it looks today as you would imagine nuclear war. Everything was mowed down to within a few feet of the ground. In the poor rural areas they are still trying to recover. I can show you acres of mobile-home scrap piled up over 30 feet high."

"As usual, the Amateur Radio Service was Florida's best-kept secret," said Stanhope. "Volunteer communicators came from as far away as Washington and stayed for weeks. They made it happen. Paul, NA4AR, Sean, N4SCF, and I wouldn't have been effective without the amateur volunteers in the field."

Texas Hams Also Honored

Charles Byars, W5GPO, and the Wichita County Amateur Radio Emergency Service® of Wichita Falls, Texas, were also honored by NOAA. Byars is an ARES® District Emergency Coordinator in the ARRL North Texas Section. For more than 30 years these hams have volunteered their time, expertise, and resources to help the National Weather Service track dangerous storms. On Tuesday, April 10, 1979, the city of Wichita Falls was struck by a large tornado. The members of the Wichita County Amateur Radio Emergency Service (ARES®), operating as Skywarn Storm Spotters, made the first report of the storm to the National Weather Service and are credited with saving many lives in the city.

Another Active Year?

Hurricane forecaster Dr. William Gray predicts "an above-average hurricane season for the Atlantic basin in 2005." There is also "an above-average probability of U.S. major hurricane landfall. We have adjusted our forecast upward from our early December forecast and may further raise our prediction in our later updates if we can be sure El Niño conditions will not develop." He predicts that there will be 13 named storms this year with 7 becoming hurricanes. His forecast predicts 35 days of hurricane activity with 7 intense hurricane days.

Dr. Grey's forecast says there is a 53% chance that the U.S. East Coast, including the Florida Peninsula, could be hit by at least one major—category three or greater—hurricane. The Gulf Coast stands a 41% chance of being hit, and there is an above-average major hurricane landfall risk in the Caribbean. These forecasts will be updated on August 5, September 2, and October 3, 2005.

Protecting Weather Info You Can Use

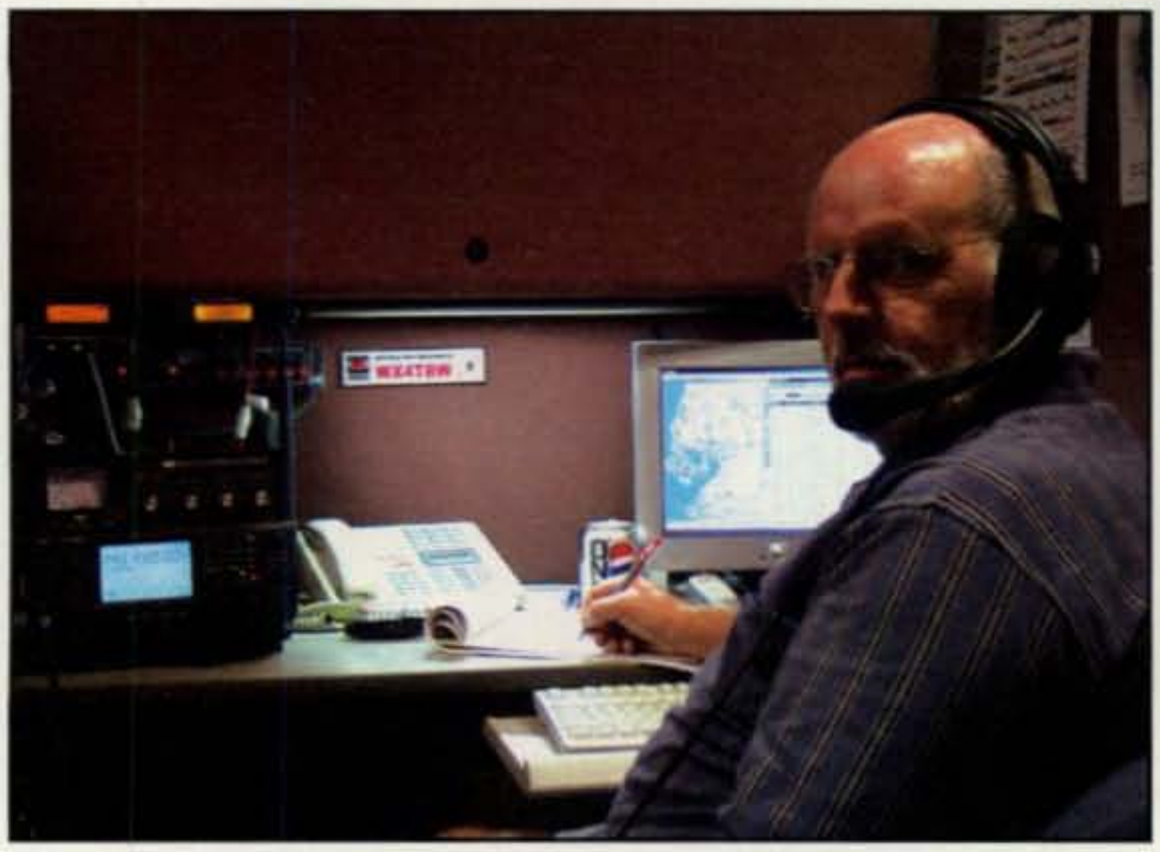
Three bills that would restructure the National Oceanic and Atmospheric Administration were introduced into Congress this spring. A bill drafted by NOAA and recently sent to Capitol Hill essentially would dissolve the National Weather Service as a distinct agency and integrate it within NOAA, possibly as "NOAA's Weather Service," diluting its focus. A second bill, H.R. 50, would recognize the National Weather Service as an agency within NOAA, but without a well-defined mission. The third bill, S-786, introduced by Senator Rick Santorum (R) of Pennsylvania, would recognize and continue the National Weather Service as a distinct agency.

Confusion on S-786

Many members of the public, including some amateur radio operators, have been concerned that the weather information currently available from the National Weather Service would have to be paid for under Senator Santorum's bill, citing a section that says that with certain exceptions and other than severe weather forecasts and warnings, NOAA would not be allowed to provide products or services that are or could be provided by the private sector. However, the next section of the bill guarantees "all members of the public have the opportunity for simultaneous and equal access" to "all data, guidance, forecasts, and warnings received, collected, created, or prepared by NOAA or NWS." In addition, it would continue the current methods of distribution of this information (1) through data portals for large volume users and (2) to the public using the methods as determined by the Commerce Department under existing federal law, including the internet, as is now the case.

Opponents of the bill have asserted that the under the bill, control of government data and information would be shifted to the commercial weather industry and citizens would have to pay twice for the data and information. In fact, S.B. 786 is the only bill before Congress that specifically requires the data be released to the public in real time.

Fourteen years ago, the NWS took the extra step of carefully delineating the respective roles of the NWS and the commercial weather industry, in addition to pledging its intention not to provide products or services that were or



Skywarn Program Coordinator Bob Stanhope, W3RMS, spent over 125 hours on duty during last year's hurricane season. (Photo courtesy of W3RMS)

Skywarn Program Director Paul Toth, NA4AR, "contributed to saving life and property in Florida." He is a former ARRL Section Emergency Coordinator for Northern New Jersey. (Photo courtesy of W3RMS)

could be provided by the commercial weather industry. However, the parent agency of the NWS, NOAA, repealed the 1991 non-competition and non-duplication policy in December 2004. Its new policy only promises to "give due consideration" to the abilities of private sector entities. The new policy has enabled NWS and NOAA to expand into areas that are already well served by the commercial weather industry.

"This decision by NOAA to repeal the non-competition and non-duplication policy detracts from NWS's core missions of maintaining a modern and effective meteorological infrastructure, collecting comprehensive observational data, and issuing warnings and forecasts of severe weather that imperil life and property," said Senator Santorum.

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Charles Byars, W5GPO, and the Wichita County Amateur Radio Emergency Service® provided warning information on a destructive F5 tornado that ripped through Wichita Falls in 1979. They were honored by NOAA along with the hams in Florida. (Photo courtesy of NOAA)

mercial weather industry and a policy of free and open exchange of government information, the American public has become the beneficiary of the best weather information available anywhere in the world," said Steven Root, President of the Commercial Weather Services Association (CWSA). "Unfortunately, the performance of the National Weather Service in fulfilling its key tasks of collecting and disseminating government information has not always kept pace with public and private needs, and critical information the agency possesses is not always reaching the public in time." He added, "Government duplication of existing products and services readily available from the private sector is unnecessary and detracts from the NWS mission of saving lives and property."

CWSA has noticed an increasing number of occurrences where the NWS has not provided timely, key information during hurricanes, floods, and severe snowstorms, exposing the public to heightened and serious danger. Just as alarming, this key information was not made available to the public or the Commercial Weather Industry, including the media. Such delayed or missing information, according to Root, has included real-time cooperative observer and snow intensity reports delayed up to 12 hours during a blizzard, hurricane reconnaissance reports delayed during an intensifying storm, and missed flood warnings.

Run for the Roses

In May, horse-racing fans had their eyes on Churchill Downs and the Kentucky Derby. While many were having a good time waiting to see which horse was going to cross the finish line first, members of Kentucky Army MARS were ready to serve if the need arose.

Army MARS member Pat Compton, KF4FMZ, said the Kentucky Emergency Management office had requested their assistance to provide back-up VHF communications for the Derby Day activities at the state capitol building in Frankfort. A MARS station was set up in the Franklin County Mobile Command Post, which was parked in front of the capitol building. All communications were carried out on a local repeater.

Amateur television (ATV) was used to send pictures from the different Derby Day events back to the Mobile Command Post. State and local officials who were at the post said they were very pleased with the quality of the pictures. "Although this was only a short, 5-hour exercise," said Compton, "we learned a lot. Cooperation between MARS and the involved agencies was great. We also made some new 'agency friends.'"

Recognition?

Often I'll surf various amateur radio web pages and see a story on emergency communications. It *might be communi*cations provided during an emergency, a public-service event, or some exciting plans for a new addition to a group's communications toolbox. Why not drop us a note about your event or send us a link to your website. Your story just might appear in this column. While you're at it, check out our column web links on the *CQ* Public Service Discussion at <www.cq-amateur-radio.com>. For those who are reading this before Field Day, look for me at K3FI. Until next time . . .

73, Bob, WA3PZO

Note

1. While NOAA has existed since 1970, it was created by executive order, not by law. Since then, according to the agency, NOAA has operated under 200 different authorizations. These bills are efforts to provide a statutory basis for NOAA's existence and activities.

60 Great Things About Ham Radio

In celebration of *CQ*'s 60th anniversary in 2005, we've come up with 60 great things about ham radio which we'll bring you each month, five at a time. We're sure you'll have more great things that we haven't thought of, so when we're all done, we'd love to compare our list with yours.—*W2VU*

This month, we'll look at a potpourri of great things about our hobby...

31. Lifelong friendships—The absolute best thing about ham radio is the great people you get to meet. Untold thousands of hams have made lifelong friends among fellow hams they've met on the air, at club meetings, events, or hamfests.

32. Finding "non-touristy" off-the-beaten-path places to stay, eat, visit, etc. —This is one of the most under-rated benefits of ham radio. If you're traveling and want to get away from the "tourist traps" and fast-food restaurants, your fellow hams who live where you're visiting can be a great source of off-the-beaten-path places you probably wouldn't otherwise discover.

33. A good way to bridge the generation gap—Ham radio makes no age distinctions and getting together with other hams, either in person or on the air, provides a great opportunity to get to know people either younger or older than you are—as peers and equals.

34. People named Joe—Now this might be stretching things just a bit, but it really illustrates just how wide-ranging ham radio is. Among our ranks are at least three people from widely different backgrounds who share two things—they're all hams and they're all named Joe:

Joe Walsh, WB6ACU, Rock 'n Roll star, guitarist with the Eagles, first became a star as a member of the James Gang.

Joe Rudi, NK7U, retired Major League Baseball player, played with the Kansas City and Oakland A's, the (then) California Angels, and the Boston Red Sox; he also went to the World Series with Oakland three times, in 1972, 1973, and 1974.

Joe Taylor, K1JT, Nobel Prize winning scientist and developer of the "JT" software suite that has made it possible for stations with average setups to take advantage of such VHF/UHF modes as meteor scatter and moonbounce. Speaking of which...

35. Moonbounce—C'mon, let's get real here. In what other hobby can you talk to people by bouncing signals off the moon? The only other people who would even *think* about something like that are amateur radio astronomers ... but did we mention that it was a ham named Grote Reber, W9GFZ, who invented radio astronomy in his back yard, using knowledge he'd gained in ham radio?

We'll be back next month with another installment...

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BY KENT BRITAIN,* WA5VJB

75-ohm "Cheap Yagis" for 70-cm ATV

This month we are going to take advantage of some 75-ohm matching techniques for a Cheap Yagi so it can be directly connected to your TV set to let you view amateur television (ATV) transmissions on the 70-cm band. Many ATV repeaters take advantage of CATV channels 57 and 58 being inside our 420–450 MHz ham band, with 57's video carrier at 421.25 MHz and 58's at 427.25 MHz. This means all you have to do to watch these ATV repeaters is build one of these antennas, connect it to a cable-ready TV set, and tune to CATV channel 57 or 58, but connect the antenna rather than commercial cable. Be sure to check your local repeater guides to see if there is activity on these frequencies in your area (if there isn't, start some!)

By the way, there are a few ATV systems still using 434 MHz—none in Texas, but a few in the Northeast. The frequencies used are not compatible with cable-ready TVs, and a 50-ohm input down converter is usually used. To head off questions, no, I have never developed a 75-ohm Cheap Yagi for 434 MHz.

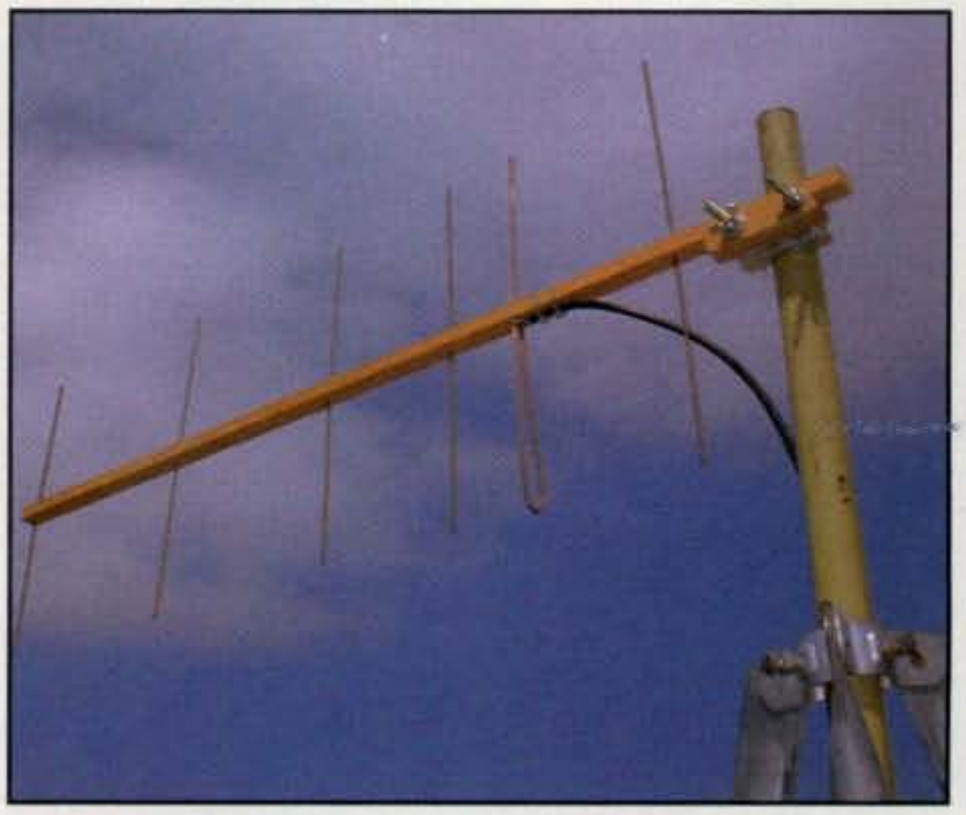

Photo A– An ATV Cheap Yagi. This antenna will cover the two popular amateur television channels at the lower end of the 70-cm band.

Impedance Secrets of the Cheap Yagi

The J driven element used in my Cheap Yagis has about a 150-ohm impedance if you just mount one all by itself. By using the loading effects of the Yagi reflector and directors, I bring the impedance of the driven element down to 50 ohms. This gives a direct impedance match to 50-ohm coax—no T-bars, no gamma capacitors, no baluns. Just by widening the spacing a bit, it is easy to come up with a 75-ohm version (see photo A and fig. 1). By controlling the element spacings, Cheap Yagis can be designed to directly match feedlines from about 20 ohms to just over 100 ohms. I once used this to design a telemetry antenna for use with 93-ohm coax, but most of the antennas have been for 50- and 75-ohm coax. From the technical side, the higher impedance matching results in a Yagi with slightly lower gain but a bit wider bandwidth. For those wide TV signals, this works out pretty well.

Construction

Dimensions for the driven element are in fig. 2; element lengths and spacing for 6-element, 9-element, and 11-element versions are in Table I. With the 6-element expect about 10.5 dBi gain, the 9-element just over 12 dBi gain, and the 11-element just over 13 dBi gain. All three antennas showed about a 30-dB front-to-back ratio.

Start all your measurements from the reflector. It's best if you start there for each element. When you try to measure cumulatively—that is, + 5 inches, + 5.5 inches, etc.—there is nearly always a cumulative error that creeps in. It's the total position, not the relative position, of the elements of a Yagi we want to optimize.

I like to use 1/2" × 3/4" wood for my booms. You can get away with 3/4" × 3/4", but I wouldn't use anything thicker. For the elements I used RadioShack ground-rod wire. This solid aluminum wire runs about $5.00 for 40 feet, enough to build

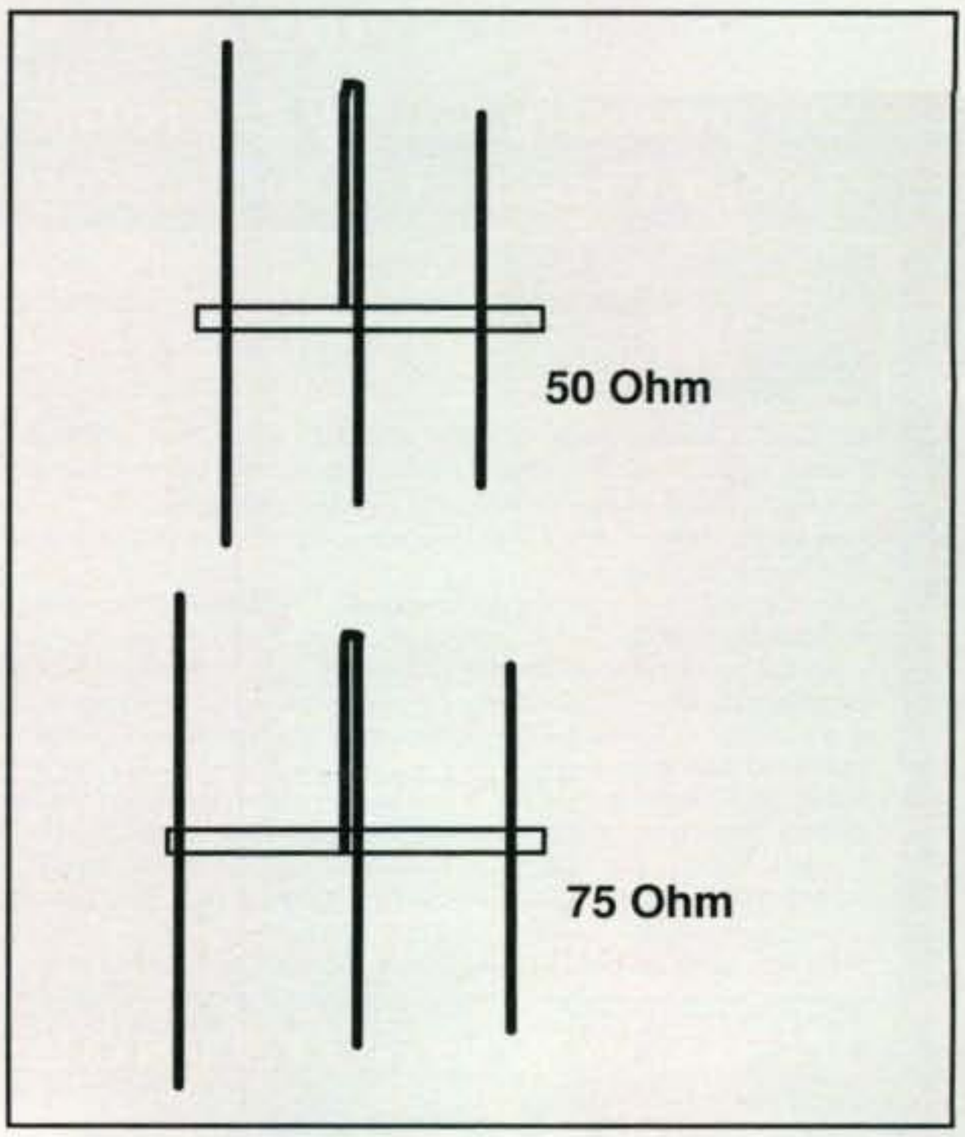

Fig. 1– 50-ohm and 75-ohm spacing.

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Enjoy a full 5 watts output from a small HT! Great 2m/440 TX & RX, xtended RX range from 76~999 MHz, includes wide band FM; alpha display, 4 scan modes, 200 memories, CTCSS & DCS encode+ decode, split-band ops, auto-dialer, SMA antenna port 13.8 VDC direct input - all in a compact size. ***Xtra rugged.***

DJ-S40TD 440 MHz HT

This pocket HT features 500mw output using AA cells, and up to 1 watt using an optional NiMH battery. 100 memories, CTCSS encode + decode, SMA antenna port, great audio, theft alarm and more.

DJ-596T Mark II Dual-Band HT

VHF and UHF performance in a great looking package. Easy to operate with a large, backlit alphanumeric display, full-size control pad, powerful Ni-MH battery, 6 ~ 16 VDC auxiliary power input, up to 5 watts output. 100 memories, CTCSS and DCS encode+decode, WFM+NFM, plus super-accurate frequency stability that meets the toughest standards of demanding users! Also, be sure to check out the optional digital voice communications board and the many accessories tailored to your operating needs.

DJ-196T (2M) DJ-296T (222 MHz) DJ-496T (440MHz) HT

These monoband HTs all feature a large alphanumeric display with a full size backlit keypad, 40 memories, CTCSS and DCS encode+decode, autodial, 13.8 VDC input and more. High power battery is standard.

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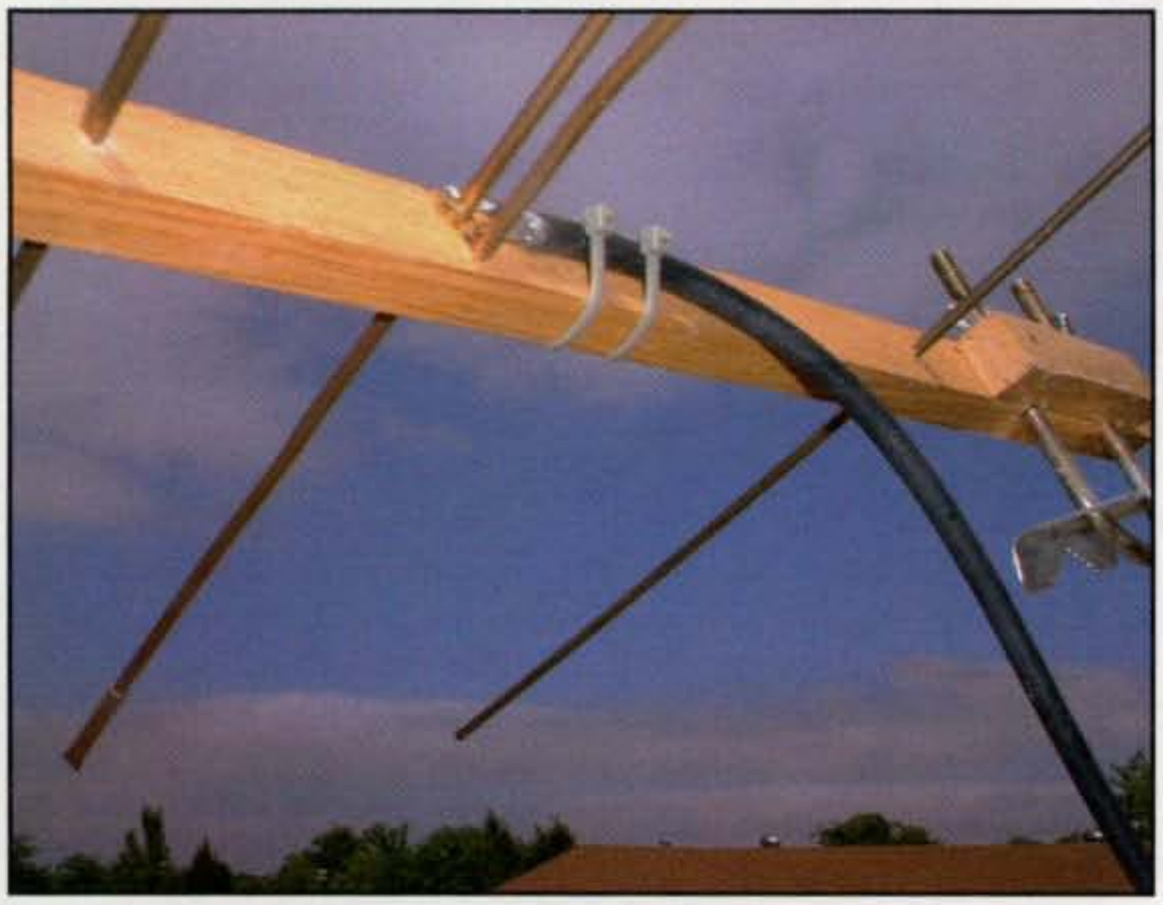

Photo B– Close-up of the driven element.

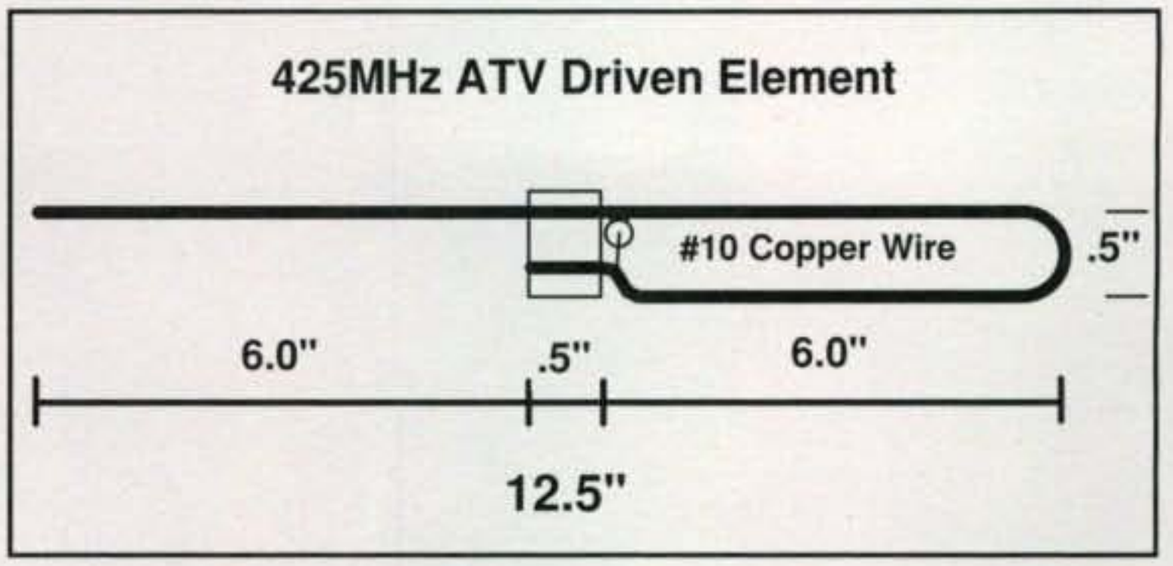

Fig. 2– Driven-element dimensions for all three versions.

a lot of Yagis. Silicon bronze welding rod, aluminum rod, copper electrical wire, and 1/8-inch hobby tubing have also been used. For the driven element you should use something to which you can solder. My personal choice is silicon bronze welding rod, which is available at welding supply stores by the pound. In addition, #10 and #12 copper wire work well.

If you want to use 3/16-inch diameter elements, make each director .2 inch shorter. Keep the reflector and driven elements the same length. It's kind of fat, but if you have a lot of 1/4-inch rod and want to use it, make the directors .3 inch shorter than the 1/8-inch dimensions. Again, the reflector and driven elements stay the original length.

The coax is directly soldered to the driven element. The coax shield goes to the center of the driven element; the coax center goes near the tip of the J. Be sure to use RG-59, at least for the first foot or two. RG-6 is good, but it's hard to find these days with a copper shield.

The elements can be held in place with a drop of "super glue," epoxy, or RTV type adhesives. If you plan to mount the antenna outside, a coat of spar varnish or even house paint greatly extends the elements' life. Be sure to put good coat of paint, RTV, or some kind of sealant on the coax braid at the driven element to keep water from wicking back down the coax. In Texas weather they seem to last about four years when I mount them outside. Inside they will last for decades.

I have had a lot of feedback on the driven-element dimensions. "Is that .5-inch loop spacing from the center lines or the edges of the elements?" The width of the loop is not a critical dimension. While watching on the network analyzer I bent one from about 1/4 inch to nearly 3 inches with little change in impedance.

Using your ATV Antenna

I have had a pair of these antennas mounted in my attic for nearly 15 years. One is looking at a 421.25-MHz output of an ATV repeater. It's pretty strong and horizontal as I recall, so I am using the 9-element version. The second is looking at a 427.25-MHz ATV output and is vertically mounted. These are combined and come down to the TV in the shack. When I'm not looking at a local TV program, I just change the TV from broadcast to CATV mode for the tuner in its set-up menu, channel surf up to channel 57 or 58, and see what the local ATV crowd is doing that evening.

If you're planning to transmit as well as receive, you need to check in with your local ATV groups, as more and more are going to cross-band repeaters, with the input on a higher frequency band. All the ATV repeaters in this area had been using 915-MHz FM ATV inputs, but I think they all have gone to 1250-MHz FM these days because of all the 915-MHz noise.

This gives the best of both worlds. FM TV has about a 17-dB advantage over AM TV to get a P5 picture, so 2 watts of FM video is about equal to 100 watts of AM video. Now the ATVer can use a low-power transmitter and a standard cable-

Cheap Yagi Dimensions

	Reflector	DE	D1	D2	D3	D4	D5	D6	D7	D8	D9
6 elements											
Spacing	0	5.2	7.4	12.7	19.4	27.0	—	—	—	—	—
Length	13.75	*	12.5	12.4	12.4	11.25	—	—	—	—	—
9 elements											
Spacing	0	5.2	7.4	12.7	19.4	26.0	32.4	37.5	43.5	—	—
Length	13.75	*	12.5	12.4	12.4	12.0	12.0	12.0	11.5	—	—
11 elements											
Spacing	0	5.2	7.4	12.7	19.4	26.0	32.4	37.5	43.5	50.0	57.0
Length	13.75	*	12.5	12.4	12.4	12.0	12.0	12.0	11.75	11.75	11.25

All dimensions are in Inches.
**All versions use the same Driven element as shown in fig. 2.*
All elements are 1/8-inch diameter material.

Table I– Element lengths and spacings (except for the driven element) for 6-, 9-, and 11-element Cheap Yagis.

Photo C– Temporary radials for your mobile.

ready TV set. For those who still think AM ATV is best, I have a trivia question for you: Can you think of any geostationary satellites that transmit AM video? There is one, only one! The rest are FM or digital video.[1]

Adding Emergency Radials to Your Mobile Rig

Just on a whim, I clipped my jumper cables to the back bumper (I may have one of the few cars that still have a metal bumper!), and then clipped those to a 50-foot extension cord, as seen in photo C. This picked up about 2 dB of field strength on 80 and 40 meters. It didn't do much for 20 meters and up, but 2 dB is almost like doubling your power. A clip-on radial doesn't do much for you on 10 or 15 meters, but it can really help on 160, 80, 60, and 40 meters. A full counterpoise with tuned element on each band is nice, but one for two long radials is easiest. Several radials soldered to a big alligator clip make a real quick ground plane. Something for your RV perhaps?

For those plastic cars, or ones with a lot of undercoating, I tried just going directly to the rig (see photo D) and clamped

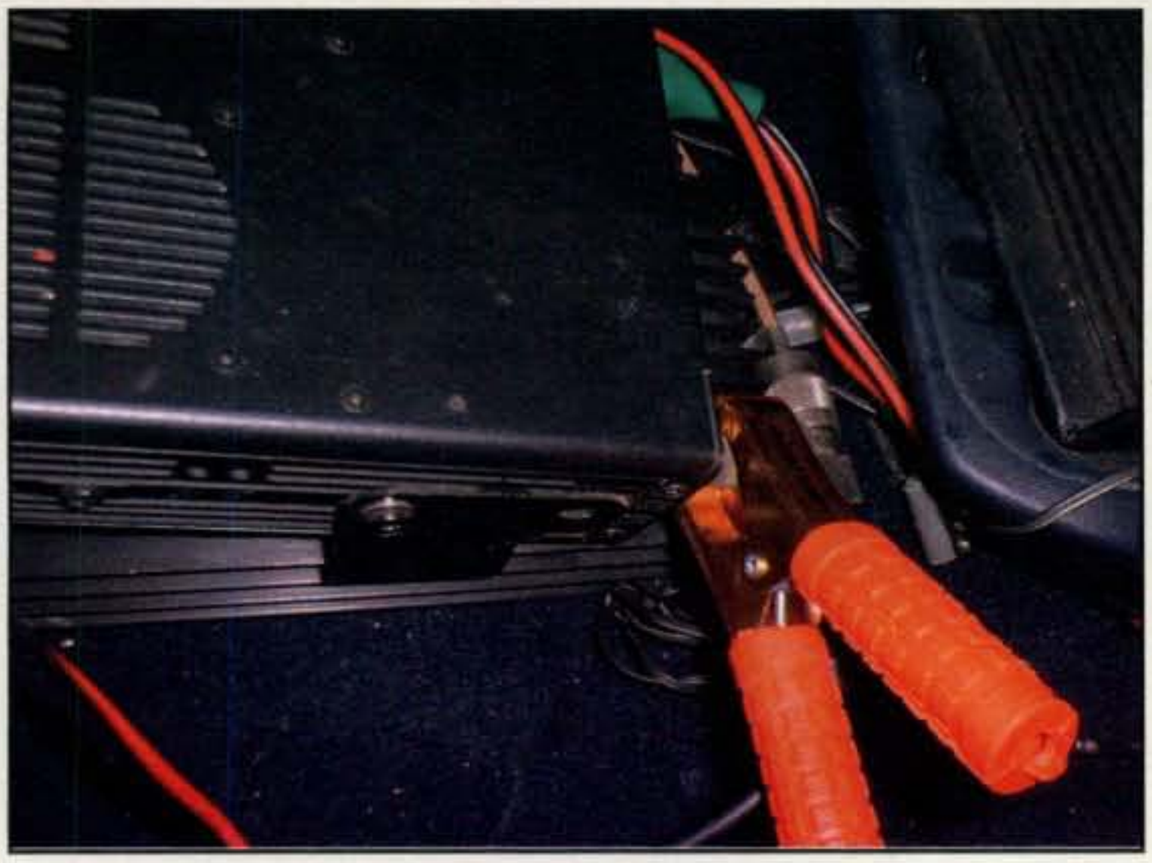

Photo D– Taking the ground radials directly to the rig.

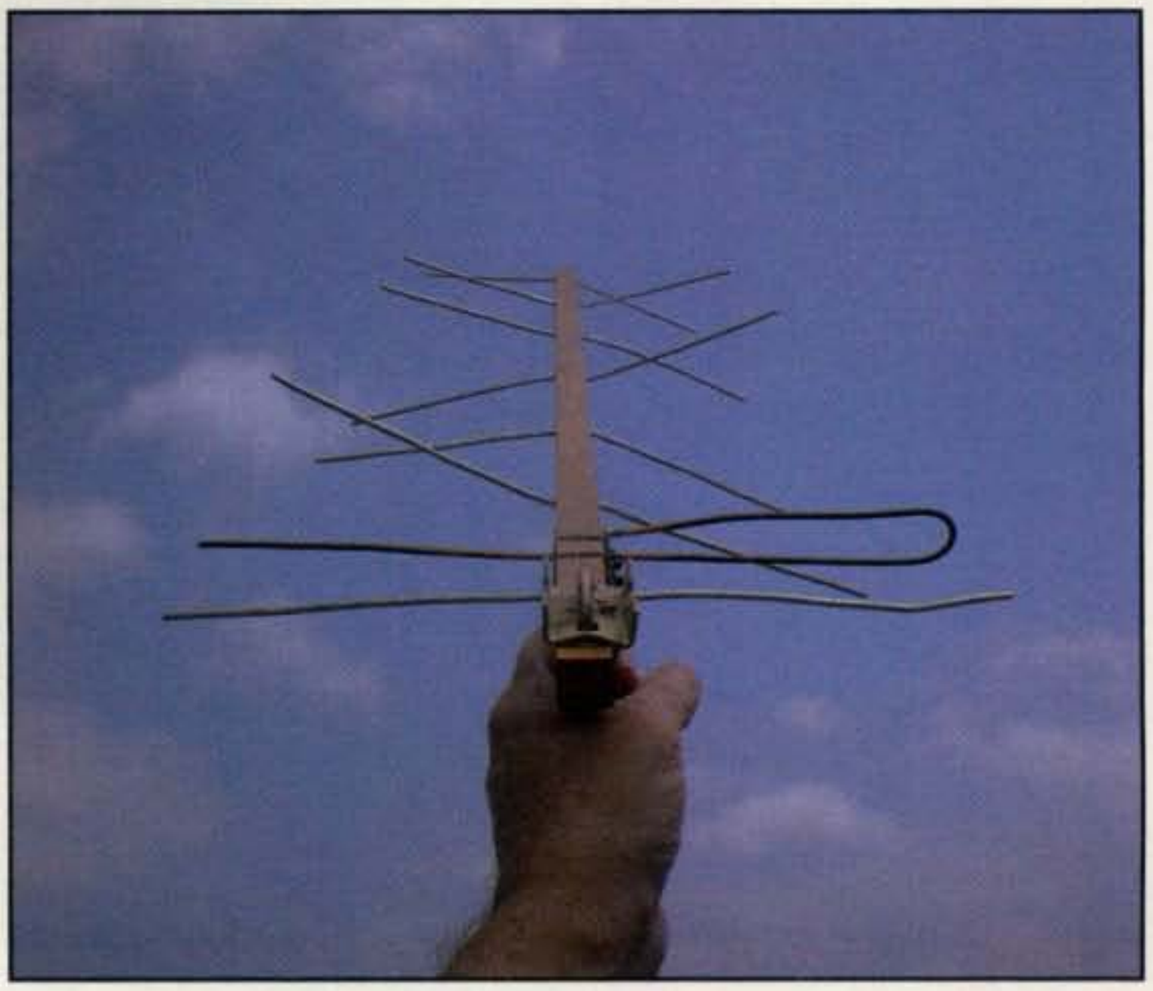

Photo E– Element-to-element alignment. This one looks like the first time I tried to build a Yagi using a round boom and a hand drill. (See "e-mail Question" below.)

the jumper cables directly to the PL-259 connector. The results were pretty much the same—about 2 dB on 40 and 80 meters.

Quick Check for Radials

A better ground plane drives your vertical down in frequency. If that extra piece of wire moves the SWR dip on your vertical from, say, 3850 to 3830 kHz, you have a better ground plane and a more efficient antenna. If it goes up, put it back the way you had it!

With the "stick"-type antennas you have to shorten the whip a bit, although physically shortening the antenna is not the way you really want to do it, and you will not be gaining much improved efficiency.

With today's motorized antennas you just move the slider to put the antenna back on your favorite frequency. The antenna now has a few less turns in its loading coil, less coil loss, and more efficiency. Double winner! *Remember: Ground-plane changes that make a vertical antenna go down in frequency are good changes!*

e-mail Question: "How bad can I build it?"

Getting all those elements carefully lined up sure makes a pretty Yagi, but how aligned do they have to be? Marc, WBØTEM, has done more of this kind of measurement than I have. On his antenna range he took one of his 11-element Yagi and started bending elements—some up, some down—until all the elements were bent relative to the driven element. Until the element tilt exceeded 20 degrees, the effect was unmeasurable, and that's not for one element, but for all elements in all directions. Therefore, a little twist in an element may make it look squirrelly, but it should still talk fine.

73. Kent, WA5VJB

Note

1. The satellite is transmitting PAL video, not NTSC, and transmits into India. Only a simple down converter is necessary for reception. Because of the high power requirements, it only has one transponder versus the typical 16 or 32 transponders.

know it works

BY DAVE INGRAM,* K4TWJ

Straight Talk on AGC and ALC

Our ongoing study of transceiver circuits and features shifts slightly in direction this month to look at two similar-sounding yet quite different and easily confused terms: AGC and ALC. This shift also serves as a convenient means of bringing transmitter-related circuits into our discussions (which have mainly focused on receivers) and expanding your general knowledge of amateur radio in the process. We understand some folks find the technical side of gear a mite boring, so we will strive to keep this discussion as interesting and upbeat as possible. Let's start with some brief basic descriptions of our featured topics.

AGC, or Automatic Gain Control, is used to control the overall sensitivity of a receiver according to the strength of incoming signals. ALC, or Automatic Level Control, is used to regulate the peak output power of SSB transmitters and linear amplifiers to prevent over-modulation and distortion. In other words, AGC helps in the *reception* of clear and easy-to-copy signals, while ALC aids in the *transmission* of clean and pleasant-to-copy signals. Both features are usually front-panel or menu-adjustable, and both noticeably influence your station's overall performance. Now let's take a closer look at each one.

Photo A– Locating the switch or button for selecting AGC speed may require some front-panel or menu study, but it is included in most HF transceivers. It is the second button from the lower left on this Kenwood TS-480. Note, too, the scale for the transmit section's ALC below the power scale on the left side of the LCD. (Photo courtesy Kenwood)

The Why of AGC

Tune across the amateur HF bands during a weekday when the pace is calm and laid back, and then tune across the same bands/frequencies on a weekend when activity is high. You will notice a great difference in signal levels. Use your home transceiver for mobiling and notice how changing from a large antenna to a short whip also affects signal levels. Next, switch off your transceiver's AGC and observe how strong signals blasting out of the speaker require "riding" the receiver's RF gain control to minimize overload. Notice, too, that with the AGC switched back on, you can almost "set and forget" the RF and AF gain controls for most average signal work. That is the purpose of AGC—controlling the receiver's overall sensitivity to minimize overload and "blocking" by strong signals. Such signals can "blow by" even high-grade crystal filters, reduce a receiver's sensitivity, and make copying weaker signals almost impossible. That is the "why" behind the need for AGC.

AGC in Action

As you probably have surmised, one form of AGC does not fit all needs or preferences. That's why virtually all AGC circuits offer at least two choices, fast and slow. Slow AGC, for example, is good for smooth, casual operating, so much so, in fact, that you can easily forget it is in use until a strong adjacent-frequency signal causes it to hold or hang and reduce receiver gain so you experience difficulty copying a desired signal. This effect is particular noticeable during contests, when the bands are crowded with signals of all levels. Switching to fast AGC produces a faster recovery time, so you can hear a desired signal during lulls of QRM. However, it can also introduce a "pumping effect" some operators find a bit irritating.

In an effort to satisfy all operating needs, several manufacturers are including triple-speed (fast, medium, and slow) AGC in their transceivers, and some units even include fully adjustable AGC. Is the extra capability worth its additional cost? That is strictly a matter of personal opinion. My advice is to try different AGC speeds at different times and under different band conditions, and then draw your own conclusion about what works best for you.

Circuit Studies

AGC works by developing a DC voltage proportional to the strength of incoming signals and using that voltage to control the gain of a transceiver's IF stages. This concept is illustrated in fig. 1. Incidentally, this simple circuit is only used as an example. There are many other circuits of product detectors and AGC systems in use today, and there are also special ICs that are product detectors with internal AGC and DSP (digital signal processing) systems.

Two AC voltages are derived at a receiver's product detector: one for audio that is amplified and applied to a speaker, and one which is rectified, filtered, and applied as bias to control the gain of IF stages. The AGC circuit's time constant—how long it takes capacitor C to discharge through output resistor R in fig. 1—determines whether AGC action is fast, medium, or slow.

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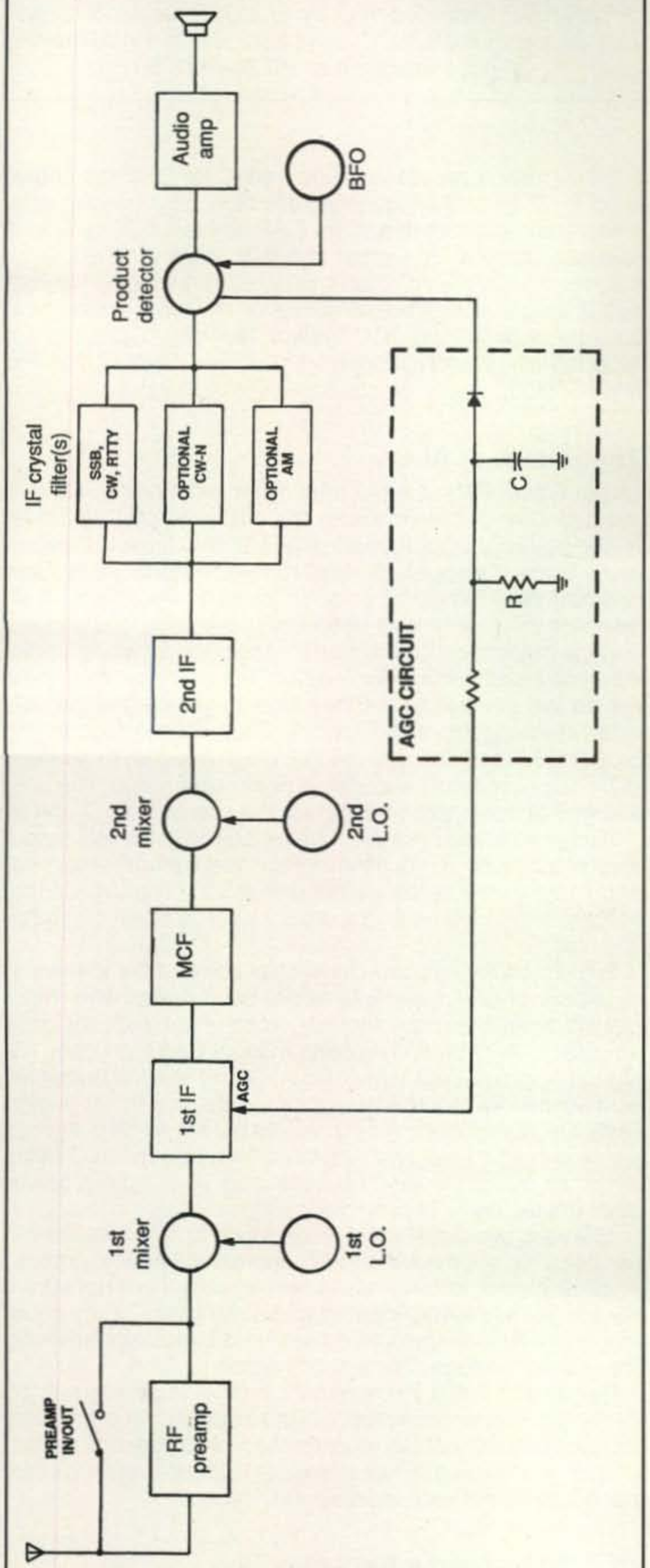
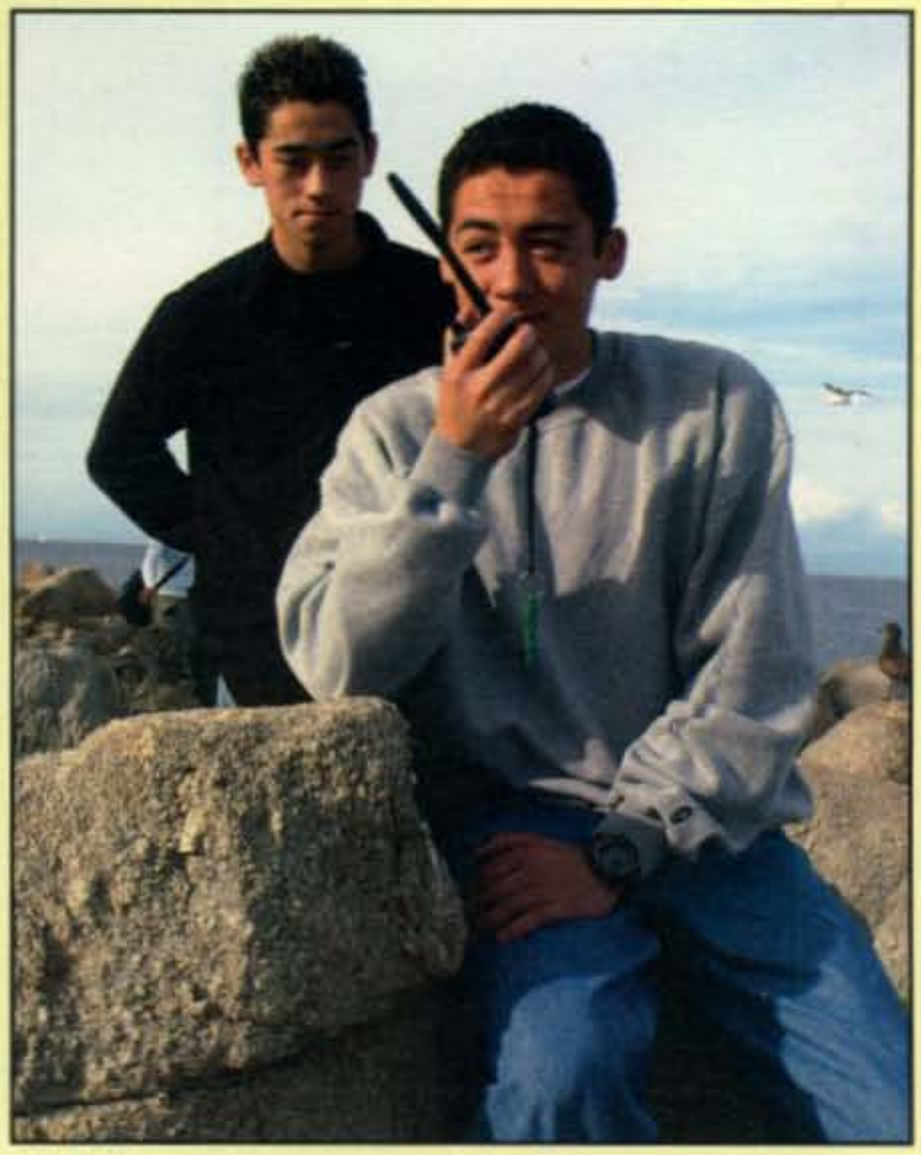


Fig. 1– Block diagram of a basic AGC system similar to that used in several economy-model transceivers. An AC voltage proportional to the strength of incoming signals is sampled at the product detector, rectified to DC, filtered, and directed back to a "front end" stage to control overall gain or sensitivity.

On the Cover



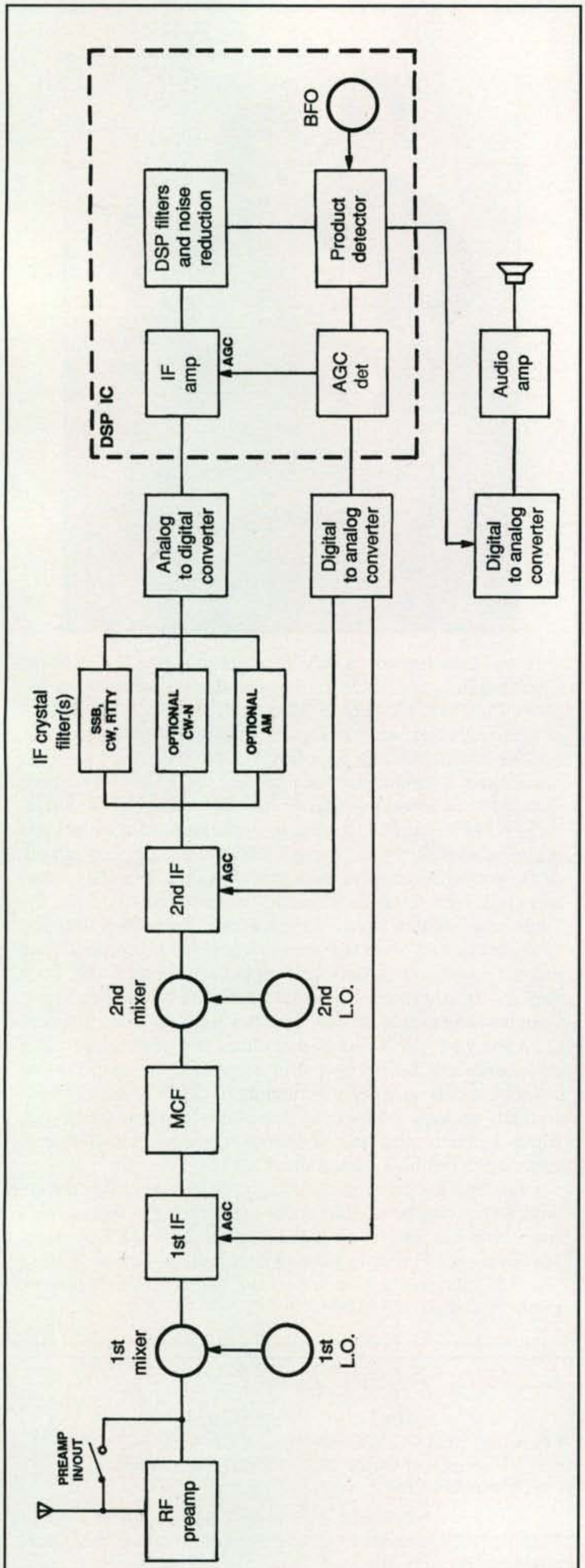
James Lagerstrom, KE6VNN, and his brother, Robert, KE6VNG, of Seaside, California, operate two meters from just above the Pacific Ocean in Monterey. Now ages 22 and 21 respectively (they were 20 and 19 when this photo was taken), both have been hams for ten years and have been very active in public service communications, helping teach at radio summer camps and in recruiting friends into ham radio. Their father, Rick, KN6FR, says he took them with him to ham events and activities when they were young, and to a licensing class as well. At the end of the class, he says, both boys told him they wanted to take their tests. They passed the code test first, then the Technician written exam, earning their Tech-Plus licenses. "They became involved in events before they had licenses," Rick noted, "passing out t-shirts, helping put up antennas, etc. Once they got their licenses, we paired them with other operators to learn how the events are run, and they've since been involved in a variety of ARES events, marathons and triathalons." Rick says James and Robert have also helped him at hamfests and conventions, as volunteers or running tables. Both brothers are currently students at Monterey Peninsula College in California, where James is majoring in computer science and Robert is majoring in business management.

James and Robert exemplify the types of ham radio connections with young people that we're highlighting in this month's issue, with our articles on K2BSA at the National Boy Scout Jamboree (p. 11) and on making ham radio a part of "Taking Our Daughters and Sons to Work Day" (p. 16). (Cover photo by Larry Mulvehill, WB2ZPI)

Looking Ahead in CQ

- "Hot Stuff at Hamvention" – Dayton report
- Results, 2004 CQ World-Wide DX Contest
- "HF Transceiver Calibration *Without* Instruments" by WAØSPM

Do you have a ham radio story to tell? See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com/guide.html>



← *Fig. 2– Simplified diagram of a DSP-based AGC system driving multiple AGC loops as used in top-of-the-line transceivers such as ICOM's IC-756 Pro.*

If the transceiver uses a dedicated IC for DSP (as shown in fig. 2), IF-level filtering, noise reduction, tune-up tone elimination, and product detection, DSP-derived AGC is D to A (digital to analog) converted and fed back to previous IF stages. If separate AGC control lines are included for various IF stages both inside and outside the DSP system, it is called a multiple-loop AGC system. Multiple AGC loops are included in high-end transceivers such as ICOM's IC-756 Pro and IC-7800.

The Basics of ALC

Unlike CW or FM, where a transmitter produces its full output during each transmission, the output of an SSB transmitter is directly proportional to the level or volume of an operator's voice. If an operator does not talk, output is zero. If an operator talks forcefully, output is close to maximum. If an operator talks extra-loud, modulation exceeds 100 percent and the output becomes distorted. In addition, people speak differently; some folks have naturally loud voices and others are so low in volume that they almost whisper—especially when speaking into a microphone. Thus, the key to ensuring proper SSB modulation is using enough mic gain to produce good output without exceeding a peak output level. The easiest way to accomplish this is with the use of ALC.

Simply explained, an ALC circuit samples the RF output level of a transceiver (or a transceiver/linear amplifier combo) and converts the resultant samples to DC. That DC control voltage is then fed back to a previous stage as gain-controlling bias.

Since modulating characteristics of voices differ and linear amplifiers of one manufacturer are often mated with transceivers of another manufacturer, each unit usually includes adjustable ALC plus instruction-manual notes on use. We should also point out that while ALC and speech compression seemingly produce the same results, this is not necessarily the case. Speech compression boosts an SSB signal's average output level and increases "talk power." ALC helps minimize over-modulation by ensuring peak output power does not exceed a preset maximum.

"But wait," we sense some readers saying. "My linear amplifier does not even have an ALC connection or adjustment." Another reader follows that statement with "I am not sure if my transceiver's ALC input is within the range of my linear amplifier's ALC output and do not want to damage anything with excess voltage." Very good points!

Remember this is only a generic tutorial to get you started thinking in the right direction. It is not a specific "how to" guide for use with every setup. *Always check with your unit's manufacturer or service center to ensure voltage levels are compatible* ***before*** *interconnecting ALC cables!*

ALC Action and Interconnection

As previously mentioned, some linear amplifiers lack ALC connections and some amateurs also elect to simply omit including an ALC connection between their amplifier and transceiver. Are such shortcuts acceptable? Generally speaking, yes—provided you reduce mic gain until output power drops off slightly to avoid over-modulation on voice peaks. Such

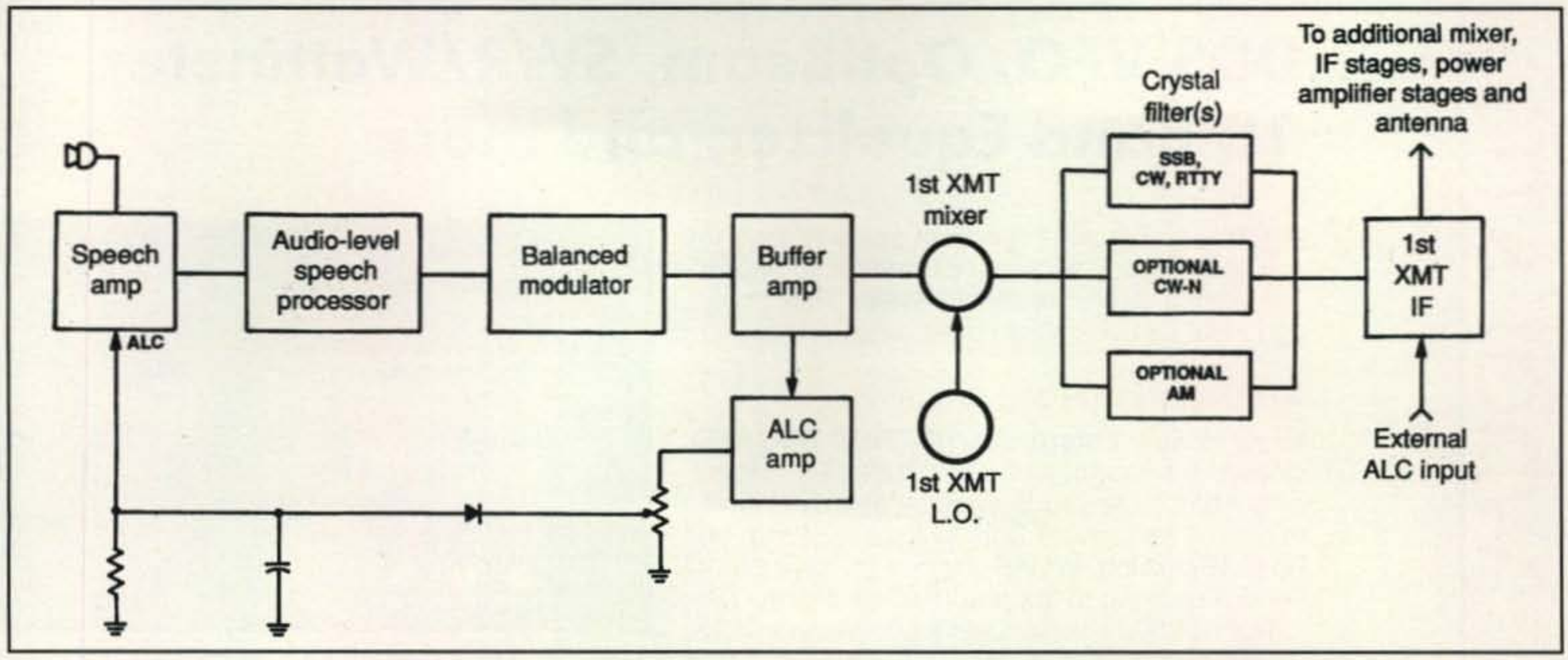


Fig. 3– Condensed outline of an economy-model transceiver's internal ALC system. (Explanation in text.)

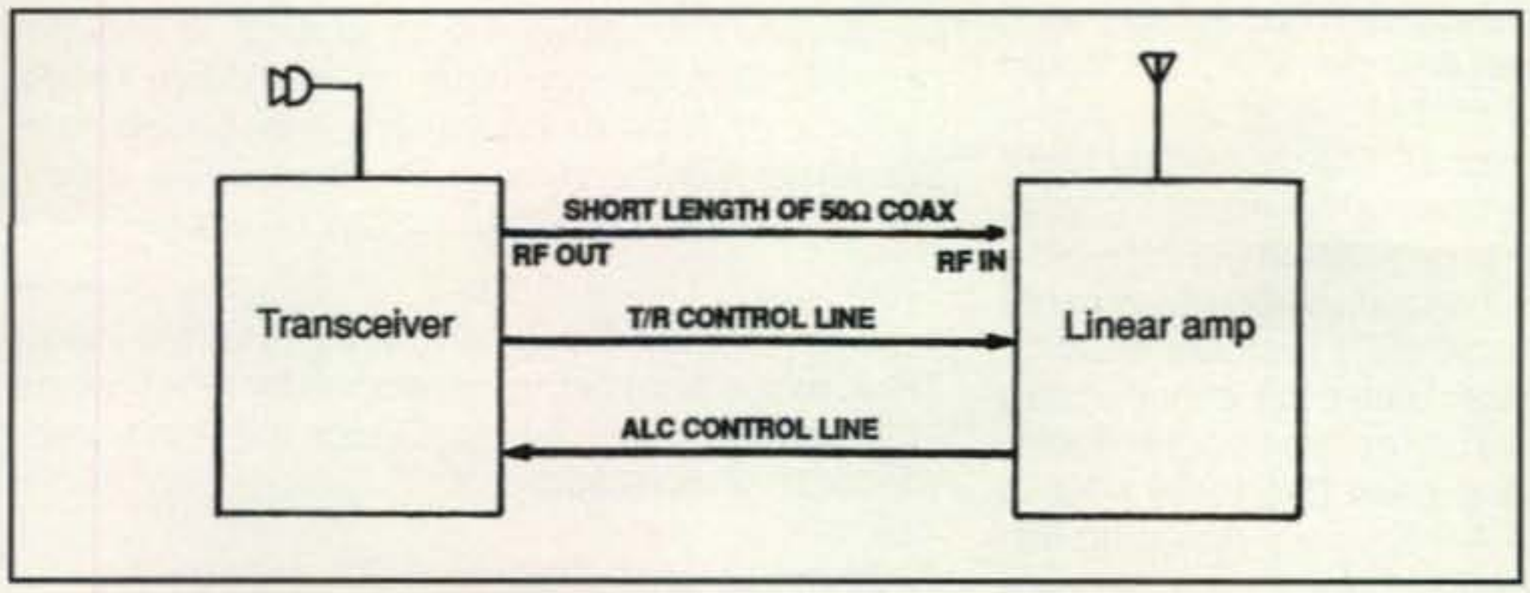


Fig. 4– Example of how a linear amplifier and SSB/CW transceiver may be interconnected for smooth ALC action. The ALC range of both the amplifier and transceiver should be checked and verified before connection.

peaks are best observed with an oscilloscope rather than a wattmeter. That is why I suggested reducing mic gain until you note a slight drop in output when using a regular meter. It is not the best solution, but it works!

A hypothetical example of a transceiver's internal ALC system is shown in fig. 3. Here output of the buffer or transmit pre-driver stage is amplified, converted to DC, and routed back to the speech amplifier to hold its gain at a preset level. Incidentally, if an external ALC input is included, it is designed to vary bias and control the gain/output of the first transmit IF, which will control overall power output. An example of ALC interconnection between a linear amplifier and transceiver is also included in fig. 4 to help clarify this discussion.

Finally, fig. 5 illustrates a simple ALC mod for operating true QRP with a 100-watt SSB/CW transceiver. The battery and potentiometer simulate a constant ALC voltage that reduces the transceiver's drive, thus lowering output to 5 watts without detuning. Cool, eh?

Conclusion

Our study of AGC and ALC, like many other topics covered in this column, could continue for many more pages. We have once again overfilled available space, however, and must now sign off.

In closing, we reiterate that we would like to hear your comments on this "How It Works" column and suggestions of topics you would like to see included in future columns. Both snail-mail notes and e-mails will be welcomed.

73, Dave, K4TWJ

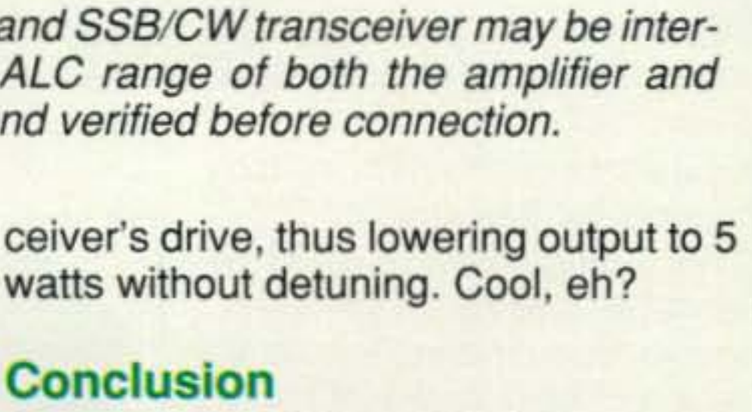
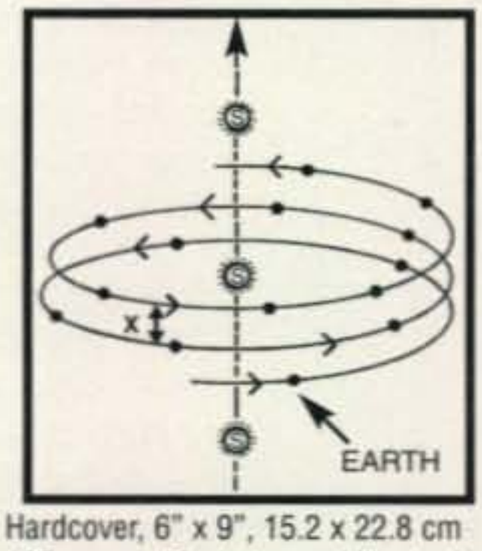


Fig. 5– Outline of a simple, yet effective ALC simulating circuit for instantly converting a full-feature 100-watt output transceiver into a deluxe QRP rig. Unplug the adapter and it returns to a 100-watt rig just as easily. (Discussion in text.)

Scientist - Author - Publisher of "Physics - Astronomy - Sciences - New Theories with Interpretations".

WALTER H. VOLKMANN

Will an Object Launched Into Space Ever Stop? Answer in Book.



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What's new

BY KARL T. THURBER, JR.,* W8FX

DDS VFO, OptiBeam, SWR/Wattmeter, 10 Band Equalizer, and more

This month, we'll focus on some noteworthy ham shack accessories, antennas and antenna accessories, software, new books, and more useful stuff of timely interest.

Accessories for the Shack

Misty Hollow Enterprises RB7500© DDS VFO. Does the frequency of your Drake TR-7 transceiver drift? Are you tired of continually retuning to stay on frequency? Don Jackson, K5ATW, and Roger Bankston, W5IAB, reportedly have solved the drifting push-to-operate (PTO) problem.

The RB7500© Direct Digital Synthesizer (DDS) Variable Frequency Oscillator (VFO) uses a Zilog EZ80F91 processor running a 50-MHz clock and an Analog Devices AD9851 DDS integrated circuit (IC) to provide a high-stability PTO replacement. The unit features a shaft encoder with 1000 steps per revolution, four selectable tuning rates, and a heavy aluminum knob for that "professional feel."

The temperature-compensated master crystal oscillator has a 2.5 parts-per-million (PPM) stability rate. The dual VFO allows button-selectable transmit and receive on different frequencies within the same band, or transceive on either of two displayed frequencies. The four-line backlit liquid-crystal display shows the band (1.5 to 30 MHz in 500-kHz bands), VFO A frequency (transmit frequency in split mode), VFO B frequency (receive frequency in split mode), split or transceive mode, transmit or receive operation, and tuning rate (see photos A and B).

The RB7500 also features six pushbutton switches. These switches provide for selection of TR-7 PTO or DDS VFO. The tuning knob is used to change bands or frequency. A selection of split (separate transmit and receive frequencies) or transceive modes, and selection of VFO A or VFO B for control, is made with the tuning knob. There's also a momentary button to transfer the content of VFO A to VFO B, and a button to transfer the content of VFO B to VFO A. A 120-VAC 60-Hz power adapter and cable for the Drake TR-7 also are provided.

The RB7500 operates over the range 32° to 120°F with a frequency stability of 2.5 PPM (±1 Hz). The output frequency is 5.05 to 5.55 MHz, and power consumption is 6 to 8 watts. The 2-lb., sheet-aluminum unit is approximately $6^5/_8$"W × $4^1/_8$"H × 6"D and painted black. Cost is $475 plus shipping and handling.

For more information, or to place an order, contact Misty Hollow Enterprises at 1509 Derby Run, Carrollton, TX 75007 (phone 214-995-9691; e-mail: <navaids@tstar.net>; on the web: <http://www.mistyhollowenterprises.com>).

Photo A– The RB7500© Direct Digital Synthesizer (DDS) VFO from Misty Hollow Enterprises is for use with the Drake TR-7. The VFO features a four-line display that shows the band, VFO A frequency, VFO B frequency, split or transceive mode, transmit or receive operation, and tuning rate. Shown is a front view in the transceive mode. (Photo courtesy of Misty Hollow Enterprises)

Note: Although the initial offering is for the Drake TR-7, models are being developed for other radios such as the Collins S-Line. Check the firm's website for new developments.

Antennas and Antenna Accessories

New OptiBeam Distributed by Array Solutions. Jay Terleski, WXØB, president of Array Solutions, offers a wide selection of antennas, stacking and

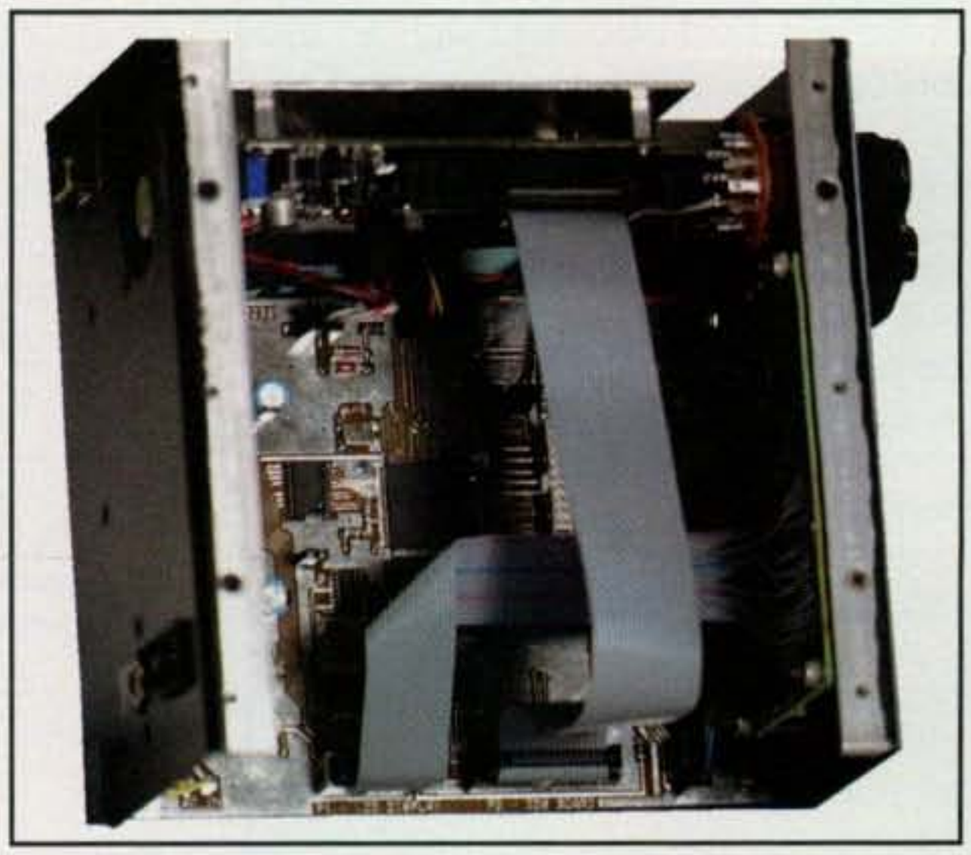

Photo B– Shown here are the internal "guts" of the RB7500 (c) DDS VFO, a high-stability VFO for the Drake TR-7 transceiver. See the text of this month's column for more details. Other models currently are under development. (Photo courtesy of Misty Hollow Enterprises)

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

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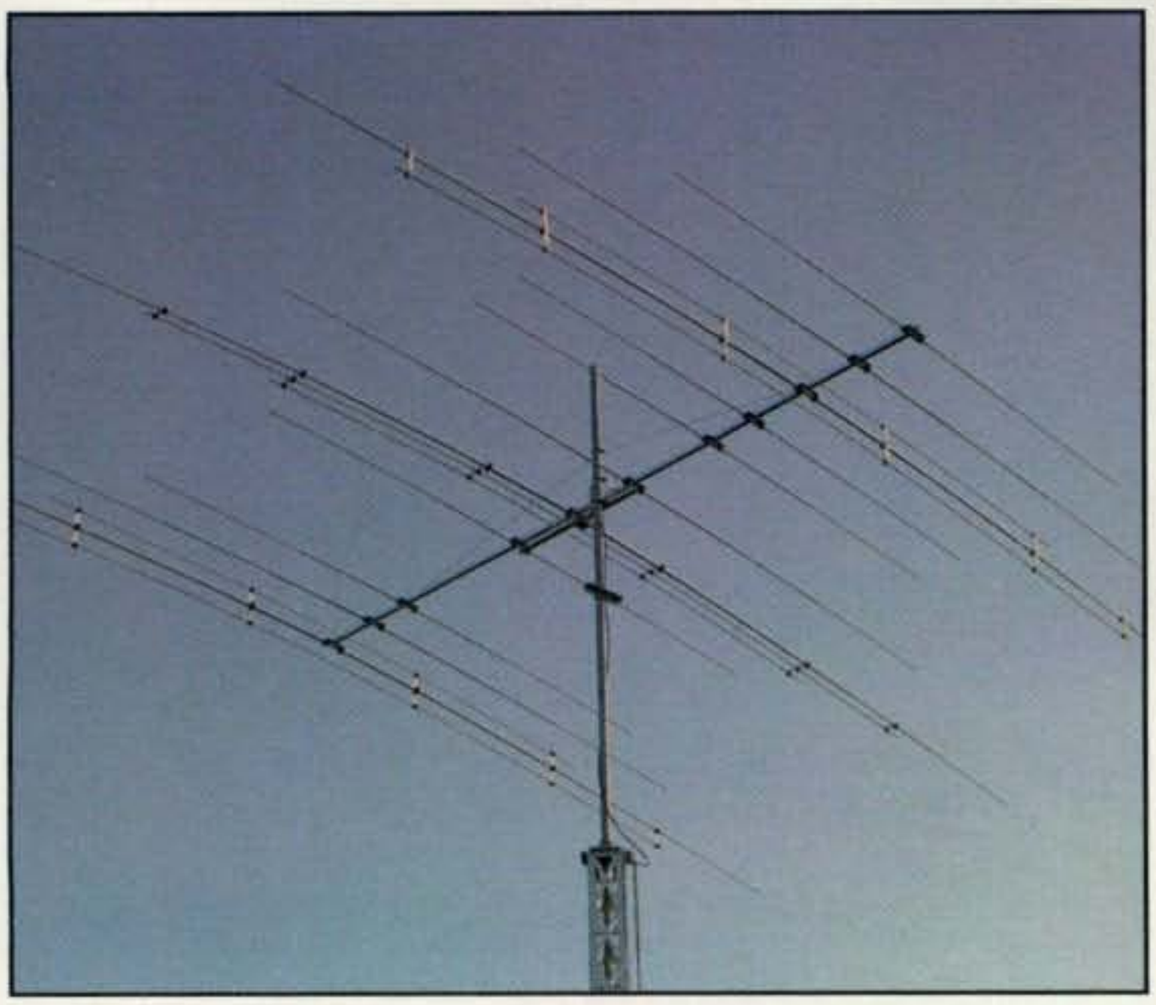

Photo C– OptiBeam has announced the newest series of multibanders in its line of high-performance Yagis, which in North America is exclusively represented by WXØB of Array Solutions. Details of the new design are in this month's column. (Photo courtesy of Array Solutions)

phasing devices, high-power antenna switches, baluns, impedance transformers, towers, rotators, and now custom antenna arrays and switching systems. OptiBeam, a well-established antenna company on the world market, has announced the newest series of multiband antennas in its line of high-performance Yagis, which in North America is exclusively represented by Array Solutions.

According to Jay, many amateurs have requested an antenna that has the following characteristics: (1) a single, full-size Yagi covering 20, 17, 15, 12, and 10 meters that has full resonant directors for all bands and that acts like five separate, optimized three-element monobanders; (2) an antenna fed by a single 50-ohm coaxial cable through a broadband, low-loss, multiband driver feed system; (3) an antenna with immediate band switching, no tuning, no switching, and no changing; and (4) sturdy, long-term reliable construction with solid elements, no moving parts, no sensitive electronics, and no weak mechanics.

Finally a new approach was developed to solve Yagi director sensitivity issues; the OptiBeam folks call it the "Hidden Sleeve Element Technique." The approach allows directors and reflector elements to be in the same positions but hidden from the critical coupling issues by another non-critical element. Photo C shows the mechanical result—a five-band "dream Yagi," one which is compact, robust, and visually attractive. The boom length is 20 feet, with three elements on 20 meters, three elements on 17 meters (hidden-sleeve elements), three elements wide-spaced on 15 meters, three elements wide-spaced on 12 meters (also hidden-sleeve elements), and five elements on 10 meters (acting like a four-element monobander).

Reportedly, both test-range and on-the-air performance show terrific results on all five bands, low SWR, extremely clean patterns, and a high front-to-back (F/B) ratio, which together means high DX performance on five bands from a single antenna. According to Jay, OptiBeam soon will announce more related models, ones having more elements and longer booms, and including 40-meter operation, all using the new "hidden-sleeve" designs using one antenna and one feedline.

Contact Array Solutions, 350 Gloria Rd., Sunnyvale, TX 75182 (972-203-2008; e-mail: <wx0b@arraysolutions.com>; on the web: <http://www.arraysolutions.com>).

RadioCraft Multi-function 3000 PRO SWR/Wattmeter. RadioCraft's proprietor, "CJ" Jobest, W7ZFX, has introduced the newest addition to his RF Sentinel line of SWR/wattmeters. Covering the range of 1.8 to 54 MHz, the new unit (photo D) features active electronic circuitry.

Power-amplifier protection is provided with the onboard "ALO" circuit, which allows the user to select disabling based either on VSWR or watts. Three mode switch settings are available for observing forward power—"average," "peak hold," and "peak." A hold-time control is user-adjustable up to 20 seconds for extended viewing of peak power output. Auto-ranging of the 300-watt and 3000-watt ranges alleviates the need to reach for a switch when changing power levels.

The two 3 1/2-inch analog panel meters are easy to read, and they have "ice blue" electroluminous lighting. Switching is provided to allow the user to select lighting "on," "off," or "keyed." The RF coupler, with SO-239 connectors, may be mounted on the rear panel of the meter or "remoted" up to 6 feet. Power requirement is 12 VDC @ 300 ma; a 115 VAC wall transformer is provided. Price is $349.95 plus s/h.

Contact Craig "CJ" Jobest, W7ZFX, at RadioCraft LLC, P.O. Box 395, Silvana, WA 98287-0395 (e-mail: <w7zfx@radiocraft-eng.com>; web: <http://www.radiocraft-eng.com>). *(Note the required "hyphen" in both the RadioCraft e-mail and internet addresses.—ed.)* Also, you may want to check out reviews on the popular e-Ham.net website, which you'll find at <http://www.eham.net>.

Software and Computers

RoMac Windows® Software-Based Equalizer. RoMac Software has announced the first Windows® software-based DSP equalizer, made specifically for the amateur radio community. The RoMac 10 Band Equalizer (fig. 1), coupled with

Photo D– RadioCraft has introduced the newest addition to its RF Sentinel line of SWR/Wattmeters. Covering the range 1.8 to 54 MHz, the new 3000 PRO features active electronic circuitry and a number of advanced capabilities. (Photo courtesy of RadioCraft)

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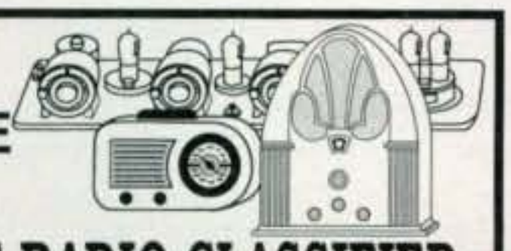

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9913/PIN	N Male Pin for 9913, 9086, 8214 Fits UG-21 D/U & UG-21 B/UN's	1.50
UG-21D/9913	N Male for RG-8 with 9913 Pin	4.00
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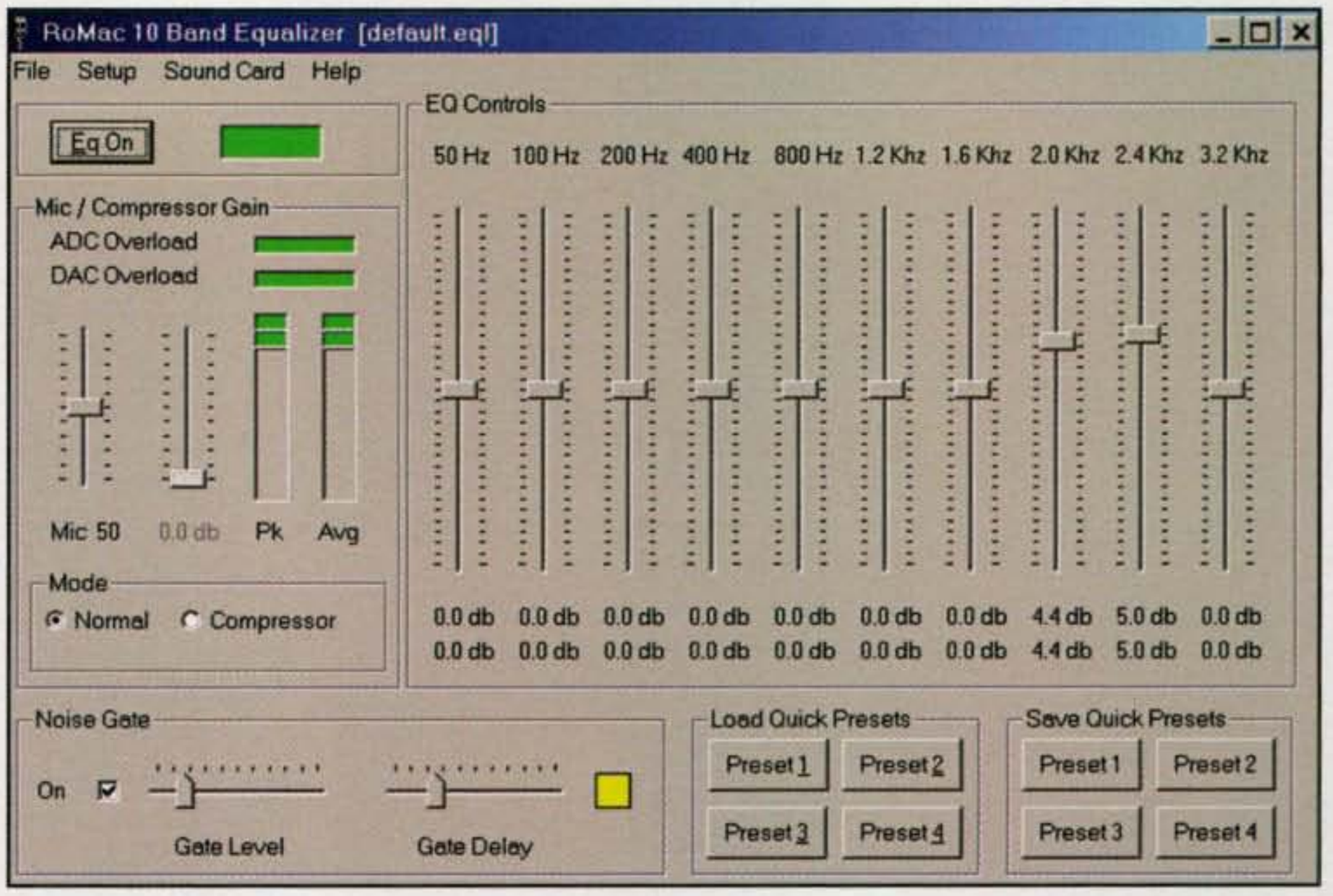

Fig. 1– RoMac Software has a new Windows® software based DSP equalizer made specifically for the amateur radio community. The RoMac Equalizer, the main screen of which is shown here, features ten individual equalization bands for optimal transmit audio. (Photo downloaded from the Romac Software website)

your computer's sound card, is said to offer you the finest digital equalizer made for amateur radio.

The RoMac 10 Band Equalizer features ten individual equalization bands for optimal transmit audio. The Equalizer has a fully adjustable noise gate, low-distortion audio compressor, and the ability to save all parameters to a file. A unique feature is the ability to program each control's passband.

Computer requirements are as follows: Windows® 98, Me, 2000, or XP with DirectX® 8.0 or higher; Intel® Pentium® III or Celeron® 400 MHz or higher processor; 128 MB RAM; 800 × 600 resolution; and a 16-bit SoundBlaster® compatible sound card (see the firm's website for further compatibility details).

The Equalizer's price is $39.95, and a free evaluation version is available on the RoMac website. For more information, contact Roger Macdonald, KF8OY, 12977 Sue Dee Lane, South Lyon, MI 48178 (248-437-8458; e-mail: <rmacdonald@romacsoftware.com>; <http://www.romacsoftware.com>).

New Awards Tracking Software from N4YB. Several months ago we profiled James L. Gatlin, N4YB's ambitious awards tracking software package for the popular Japanese Century Cities (JCC) and Japanese Century Guns (JCG) awards. As we noted, the program, dubbed "Awards JCC, JCG," allows radio amateurs to keep track of their contacts towards the popular Japan Amateur Radio League (JARL) sponsored awards.

Now James has written the second software program in the Awards Tracking Series, named Awards Canadian Islands. The new program provides users a means of keeping track of contacts made toward the Canadian Islands Award sponsored by Gary Hammond, VE3XN. The program is written in Visual Basic® and is provided in two versions on the same CD. The first version is for users who do not use software written by James, and it provides the runtime files necessary for Visual Basic programs to run on users' computers, in addition to the Canadian Islands program, database, and text files. The second version is for users who do use other programs written by James; this version installs only the Canadian Islands program, database, and text files.

Users are able to do checks on QSO totals for Worked, Total Worked, Confirmed, and Unconfirmed contacts. These same categories can be viewed or printed in report form. Checks, report viewing, and printing also are provided for the five levels of awards, plus the two plaque categories as well as for many endorsements. James says he has made this program as user friendly as possible.

Updates will be provided to registered users for a period of one year from the date of purchase at no additional charge, and at a small charge to others.

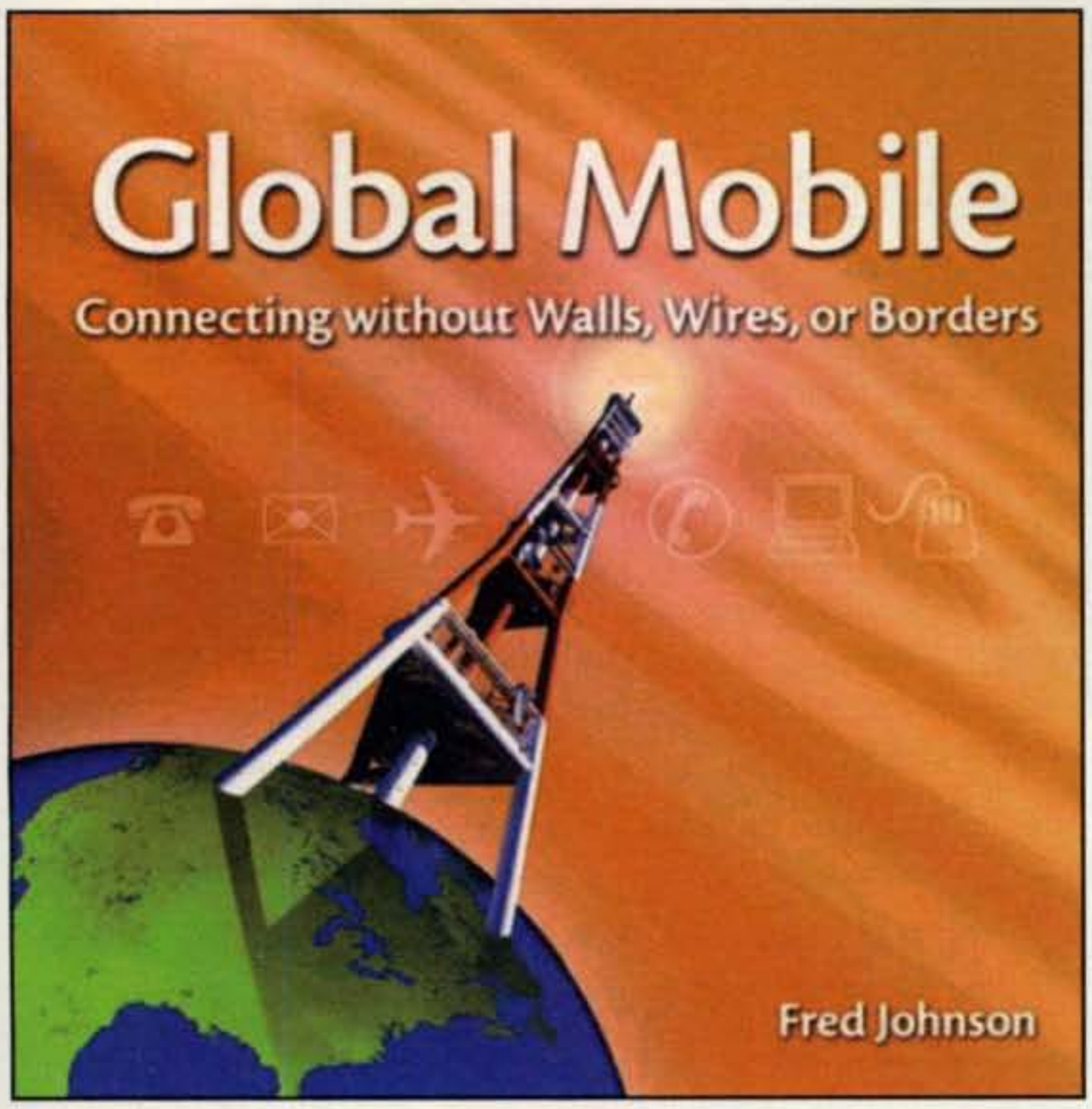

Fig. 2– This slim, compact guide outlines how to choose and use the gear you'll need to stay connected no matter where you are going. Author Fred Johnson walks you through all things wireless. (Screen capture taken from the Peachpit Press website)

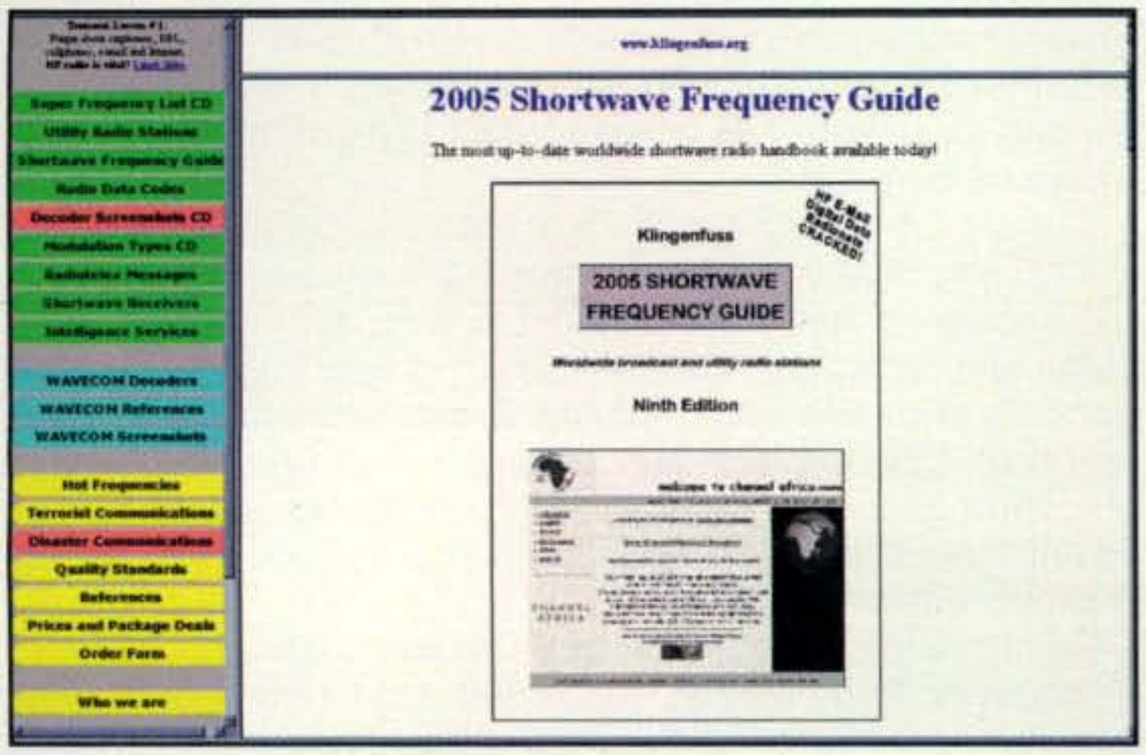

Fig. 3– A popular Klingenfuss offering is the 2005 Shortwave Frequency Guide. *It covers the latest 2005 schedules of all clandestine, domestic, and international broadcast stations worldwide, drawn from the* 2005 Super Frequency List *on CD-ROM. (Screen capture from the Klingenfuss website)*

Updates will be sent as e-mail attachments, so users will need to include a valid e-mail address with their purchase. The cost of the program is $10 USD, plus $3 shipping to USA/Canada and $4 shipping elsewhere.

For more information, contact James L. Gatlin, N4YB, 10700 U.S. Hwy. 301 South, Benson, NC 27504 (919-894-3484; e-mail: <n4yb@earthlink.net>).

From the Bookshelf

***Global Mobile* Book.** There's a "different kind" of mobile operation out there, one with which we radio amateurs may not be all that familiar and which this new book addresses.

With the proliferation of Wi-Fi hotspots and advances in mobile-phone technology, there aren't many excuses today for not being in contact with your friends, family, and associates when you travel. Using just your laptop computer and cell phone, you can stay connected from all around the globe. However, the book's author, Fred Johnson, asks if you "really" know how to use your gadgets when traveling. Also, do you have the *right* gadgets?

Enter *Global Mobile: Connecting without Walls, Wires, or Borders,* new from Peachpit Press, an imprint of Pearson Education (fig. 2). This slim, compact, 123-page guide outlines how to choose and use the gear you'll need to stay connected no matter where you're going. The author walks you through all things wireless—from getting online, to swapping SIM (Subscriber Identity Module) cards in your GSM (Global System for Mobile Communications) phone, to learning the "ins and outs" of new technologies such as Bluetooth®. You'll learn how simple it is to stay "plugged-in" most everywhere.

Crammed with helpful tips on choosing services, useful charts (such as international phone numbers and GSM coverage), a helpful packing checklist, and priceless advice, this handy guide should be packed with your laptop before you leave on your next trip. It's priced at $15.99 and is available at most bookstores.

Contact Pearson Education, 200 Old Tappan Road, Tappan, NJ 07675 (1-800-283-9444 or 1-800-922-0579; e-mail: <info@peachpit.com>; on the web: <http://www.peachpit.com>).

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Photo E– The AA4F Keyer Contact Cleaner from Vibroplex is a two-sided, extremely fine-material strip flexible enough to get in the tightest places. It is designed to clean and polish soft metals. Also, it won't grind away the silver contacts on your keyer. (Photo courtesy of Les Cox, AA4F, and The Vibroplex Company)

Sci-Fi Collection from K6JW. Sci-fi and amateur radio together, in a single book? Yes, indeed. *Spacebraid and Other Tales of a Dystopian Universe* is a collection of one science fiction novella and seven fantasy and horror short stories by long-time amateur J. Allan Wolf, K6JW.

The novella, "Spacebraid," is the story of a dedicated and brilliant group of individuals who seek to escape ecologic disaster by time-traveling into the future. Of course, such escape is complicated and must be kept secret from those who would try to take over the process. The need for secure communications is met through amateur radio. Set in the not-too-distant future, the story describes the use of vintage amateur gear to pass critical information between principal characters.

The seven other stories in the book serve to complete an eclectic collection of "weird tales" that are rooted in human emotions and desires and that will appeal to lovers of science fiction, fantasy, and horror. The collection reportedly makes a perfect companion for those nights when the bands are dead.

The book is available through all major online booksellers, on order through brick-and-mortar bookstores, or directly from the publisher. The paperback edition generally sells for $19 and the hardback for $31, although price may vary somewhat between discount and retail sellers. Contact Xlibris, 436 Walnut St., 11th Floor, Philadelphia, PA 19106-3703 (1-888-795-4274; e-mail: <info@xlibris.com> or <orders@xlibris.com>; on the web: <http://www2.xlibris.com>).

Note: To easily find the book on the publisher's website and navigate directly to it, try typing in this web address: <http://www2.xlibris.com/bookstore/bookdisplay.asp?bookid=23212>.

New Books and CDs from Klingenfuss Publications. For more than 36 years Klingenfuss has been one of the world's leading publishers of books and CDs for professional shortwave (HF) radio monitoring. On its impressive website you'll find a large number of sample pages from the firm's comprehensive list of products, plus a number of fascinating radio-monitoring screenshots. A company based in Germany, Klingenfuss is an international publisher, and all of its products are published in English.

Klingenfuss offers a number of products, including the *2005 Super Frequency List* on CD-ROM, *2005 Shortwave Frequency Guide, 2005/2006 Guide to Utility Radio Stations, RadioTelex Message Guidebook, Encyclopedia of Intelligence and Secret Services, Radio Data Code Manual, Digital Data Decoder Screenshots on CD-R,* and more—including signal sound CDs and analyzers and decoders.

A popular current offering is the *2005 Shortwave Frequency Guide* (fig. 3), which now is in its 9th edition. It covers the latest 2005 schedules of all clandestine, domestic, and international broadcast stations worldwide, drawn from the firm's *2005 Super Frequency List* on CD-ROM. The guide is claimed to be the most up-to-date worldwide shortwave radio handbook available today, and it includes a large frequency list with more than 9300 entries, as well as a superb alphabetical list of stations. Another 9700 entries cover utility stations worldwide.

For more information, include product pricing and various package deals, contact Klingenfuss Publications, Hagenloher Str. 14, D-72070 Tuebingen, Germany (tel. +49 7071 62830; e-mail: <info@klingenfuss.org>; on the web: <http://www.klingenfuss.org>).

Note: The *2005 Shortwave Frequency Guide* and the *2005 Super Frequency List* CD-ROM also are available domestically from the American Radio Relay League (ARRL) at <http://www. arrl.org/shop>.

More Useful Stuff

AA4F Keyer Contact Cleaner from Vibroplex. The Vibroplex Company has announced the new AA4F Keyer Contact Cleaner (see photo E). Why the new product? Well, the contacts on quality keys are made of silver, and attempting to clean these contacts with sandpaper, an emery cloth, or a file can ruin them. The silver contact is a soft metal that can easily be damaged.

The new $4.95 Keyer Contact Cleaner is a two-sided, 1/2" × 4 1/2" strip that is made of extremely fine material. It is flexible enough to get in the tightest places and is designed to clean and polish soft metals—cleaning your contacts but not grinding away the silver. To use it, simply insert the contact and hold it closed with light pressure. Then pull the cleaner strip through the contacts. One or two passes should be sufficient. The cleaner is said to keep your key working perfectly with occasional use.

For more information, contact The Vibroplex Company, 11 E. Midtown Park, Mobile, AL 36606-4141 (telephone1-800-840-8873; e-mail: <catalog@vibroplex.com>; on the web: <http://www.vibroplex.com>).

Wrap-Up

That's all for this time, gang. Next time, more "What's New." See you then.

Overheard: Over the years I've found that the wise person is somewhat slow in choosing his or her friends, but much slower in changing them.

73, Karl, W8FX

Note: *Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

BY JOE LYNCH,* N6CL

KC4/W1MRQ Antarctic EME Operation for Austral Winter

Amateur radio operations from Antarctica have always been challenging, not only because of the foreboding environment, but also because of the work demands of the assignment. The following is from the Raytheon Polar Services Company (RPSC) website (http://rpsc.raytheon.com/employ/spec_reqs.asp). RPSC is the contractor for staffing most civilian positions for the National Science Foundation (NSF) in Antarctica:

In addition to the environmental challenges of the Antarctic continent, the working conditions present their own challenges. Schedules are often hard to keep due to unpredictable weather and difficulties associated with transportation and communications. Six- to seven-day work weeks are the rule.

Candidates for employment must pass stringent physical and dental examinations after receiving an offer of employment. These include a comprehensive physical examination, according to National Science Foundation standards, and a psychological examination, for those people "wintering on the Ice."

As you can see from RPSC, working on Antarctica is not something in which the employee can easily come and go. Once employees are in place, they are there for several months during Antarctica's winter period, which lasts from February to August. Because of the harshness of the winter environment rarely can a plane land, and subsequently take off. On two separate occasions, however, daring rescues of sick personnel have been successfully accomplished. The first one took place in 1999, when Dr. Jerri Nielsen was evacuated by U.S. Air National Guard from the Amundsen-Scott Station, after she self-diagnosed her breast cancer. She later published her story in *Ice Bound: A Doctor's Incredible Battle for Survival at the South Pole,* released in 2001 by Hyperion.

e-mail: <n6cl@sbcglobal.net>

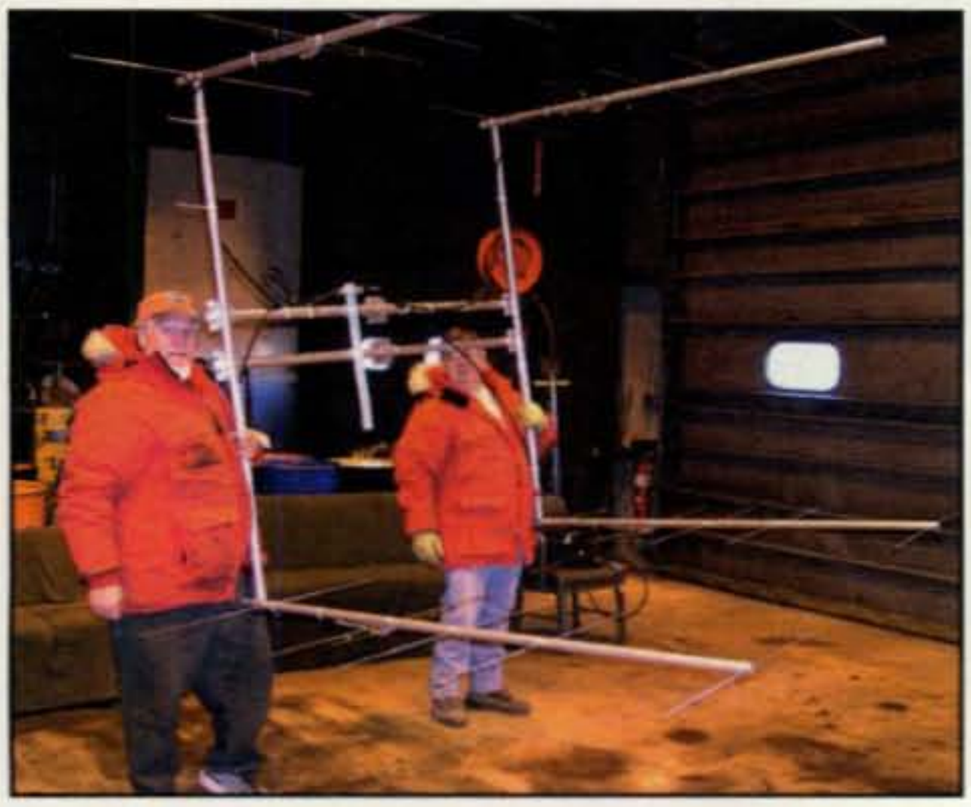
VHF Plus Calendar

July 1	Great Plains Super (Balloon) Launch. (See text for details.)
July 6	New Moon.
July 8	Moon Apogee.
July 10	Moderate EME conditions.
July 14	First Quarter Moon.
July 15–17	Mid Summer Six Club Contest. (See text for details.)
July 16–17	CQ WW VHF Contest. (See text for details.)
July 17	Poor EME conditions.
July 21	Full Moon and Moon Perigee.
July 24	Very Good EME conditions.
July 28	Last Quarter Moon. The *delta-Aquarids* meteor shower predicted peak.
July 28–31	Central States VHF Society Conference. (See text for details.)
July 31	Poor EME conditions.

EME conditions courtesy W5LUU.

The second rescue took place two years later, and is now considered the most daring rescue from Antarctica. Dr. Ronald S. Shemenski was stationed at the same location as Dr. Nielsen, when he was diagnosed as suffering from gall bladder problems and potentially life-threatening pancreatitis. Subsequently, on April 26, 2001, he was evacuated by way of an eight-seat Twin Otter plane that had been modified and fitted with skis for landing gear.

In both rescues the Internet played a significant communications role. While the Internet has supplanted much of the amateur radio communications from Antarctica, even so, amateur radio remains a backup for emergency communications from there. Thus, amateurs still regularly operate from that formidable QTH. While most amateur radio operating takes place on the HF bands, there have been rare VHF and above operations from Antarctica, one of them conducted by Mike Staal, K6MYC, of M^2 Antennas several years ago. Beginning this past winter, however, 2-



Ernie Gray, W1MRQ (right), and unidentified fellow Raytheon Polar Services Company employee holding assembled EME array. (EME story photos courtesy of W1MRQ)

Ernie, W1MRQ (left), and other Raytheon Polar Services Company employees attaching the assembled EME array to the McMurdo ham station's Rohn 55 tower.

Ernie, W1MRQ, posing with his EME array.

The Yaesu FT-847 and laptop computer used in the KC4/W1MRQ EME station.

meter EME operators have had the rare opportunity to work an ongoing DXpedition to Antarctica, run by Ernie Gray, W1MRQ. Here is his story of his setup and operation during its first few months:

"I am a heavy vehicle mechanic, working for Raytheon Polar Services Company, under contract to the National Science Foundation in Antarctica. This is my third 'winter on the Ice,' and my first operating an EME station from here. My previous operating was limited to 20 meters on equipment provided by NSF. I determined with the declining solar cycle, 20-meter openings were going to become scarce, so I decided to expand my operating choices.

"My long time friend in New Hampshire, Larry Blouin, K1CA, and other friends in the northeast decided a 2-meter EME station was possible since the advancement of Joe Taylor, K1JT's WSJT software. Running JT65 allowed stations that heretofore would be very marginal to all but the largest moonbounce stations around the world, to be very workable.

"I already owned a good rig and computer, and had 20 years experience on VHF/UHF/SHF weak signal operation as part of the K1WHS contest effort from Maine. I am active through 10 GHz with my own equipment from NH, now in storage until I finish this madness in a few more years.

"Missing from the station were antennas, H-frame and phasing harness, linear amplifier, and rig interface. Bill Olson, K1DY, built the Fred Stefanik, N1DPM, designed antennas. Dave Olean, K1WHS, of Directive Systems, built the H-frame and phasing lines. Larry, K1CA, had a West Mountain Radio RIGblaster in his shack which he loaned me, and Al Cerniauskas, WA1T, had an RF Concepts 170-watt brick amplifier available which Steve Kostro, N2CEI, of Downeast Microwave, repaired and tuned up for me. I may be the one at the pointed end of the pile-up, but this is a team effort all the way.

"With all these pieces ready for shipment, I had to transport them down to Antarctica. The only practical way to get the equipment to the ice was to an APO address in San Francisco, which meant involvement of the US Postal Service. At nearly $2.00/pound, I spent $227.00 in shipping and insurance to move the station. I shipped everything down because I did not want to deal with our TSA (Transportation Security Administration), airline security, and customs in New Zealand, while passing through that country. Maybe in years past I would have carried the rig, but not now. I only carried my computer, which so many other travelers now also carry with themselves.

"For everyone, getting to Antarctica is a long journey, which starts at their respective home airport, and then going through plane changes to go through Denver, where Raytheon's headquarters is located. After a flight from Denver to Los Angeles, it is next a 13-hour plane ride to Auckland, New Zealand, then on to Christchurch, New Zealand, where the International Antarctic Centre is located. Everyone heading for the Ice goes through here for clothing issue, orientation, and the final flight on a U.S. Air Force cargo jet, now a relatively new C-17 Globemaster, replacing the antiquated C-141 Starlifter. My three packages take the same route, except through San Francisco, and finally to the Christchurch APO, where they are bundled on a 4-foot by 4-foot by 6-foot cargo pallet, and then ride down on the same plane as regular passengers.

"I departed the States on January 10, and arrived at McMurdo Station on January 18. As it turned out, my boxes arrived one at a time, and it was approximately three weeks after I arrived before I received all of them. The box with the rig was the last, and I was getting worried. I had insured all of the equipment in case of loss, which would have financially compensated me. Needless to say, however, losing any one of the three boxes would have canceled the operation.

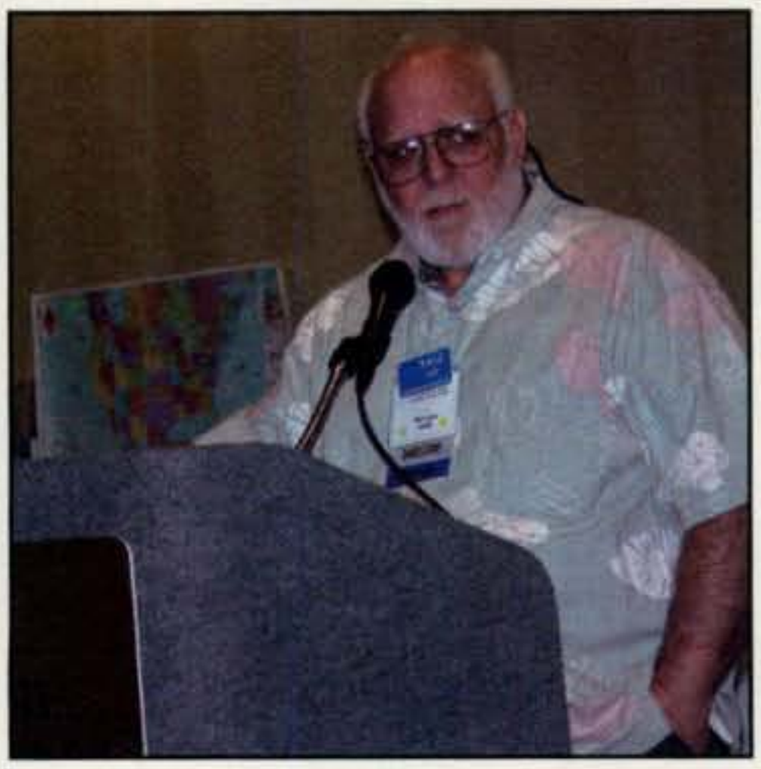
"Even after the equipment arrival I had to wait for February and the station closing for the winter. This is when everyone from the summer crew goes home and leaves the winter crew to themselves, cut off from the rest of the world with no flights in or out until the end of August. It is also when I get my winter room assignment, which was very important to me when I started the antenna assembly line.

"The station I shipped down consisted of the following: a Yaesu FT-847 transceiver, an RF Concepts RFC1-170 linear amplifier, a Drake WV-4 wattmeter, four Directive Systems DPM144-5LVA 5-element Yagis, a Directive Systems custom H-frame, a Directive Systems Power Divider and Phasing Harness, a West Mountain Radio RIGblaster Plus, an HP laptop computer, w/WSJT v4.9.7, plus all of the interconnecting cables (no radio or computer store down here to run to for replacements).

"Putting together my station began with my building the H-frame and antennas in my room over the course of a couple weeks in my spare time, which was on nights and weekends. Next, I moved these components to my work center where I had lots of floor space, assembled them into an array, and soldered the T-match together. Then, I used a USAP (US Antarctic Program) truck and drove the array to the tower at the McMurdo ham shack, and installed it on one leg of the 30-foot Rohn 55 tower that holds our TH7DXX tribander. I had to be able to aim the array by hand and also had to have access to the center of the H-frame to loosen and tighten the bolts, so the installation had to be just right to accommodate these requirements.

"With the antennas in place I used an existing piece of 7/8 Heliax left abandoned in 1996 from another project. The next weekend, I assembled the rest of the station and lo and behold, everything survived the 14,000-mile plane ride to come together here and work.

"On April 3, I ran my first EME sked with my mentor in NH, Larry, K1CA. We did not have a complete contact, but we both copied each other's echoes from the Moon. I actually messed up the sequencing and eventually lost Larry to a moving Moon that I incorrectly tracked. The following weekend I had skeds with Joop Mutter, PAØJMV, and Bernd Mischlewski, DF2ZC, both of whom turned out to be friends and great helpers in my effort. Joop and I have since been working closely, evaluating the station for improvements. Furthermore, he has devoted a portion of his website to my effort. Joop's website is: <http://home.planet.nl/~pa0jmv/>. At that URL, click the link to



Southeast VHF Society Secretary Bob Lear, K4SZ, moderating the 2005 conference banquet. (Southeast VHF Society photos courtesy of N6CL)

ARRL First Vice President Joel Harrison, W5ZN, delivering the banquet speech at the Southeast VHF Society's 2005 conference banquet.

KC4/W1MRQ. There you will find a clearinghouse for my schedule calendar. Bernd publishes an EME newsletter, and keeps the world updated on worldwide EME adventures, such as mine. You can find a link to that newsletter on his website: <http://home.t-online.de/home/df2zc/>.

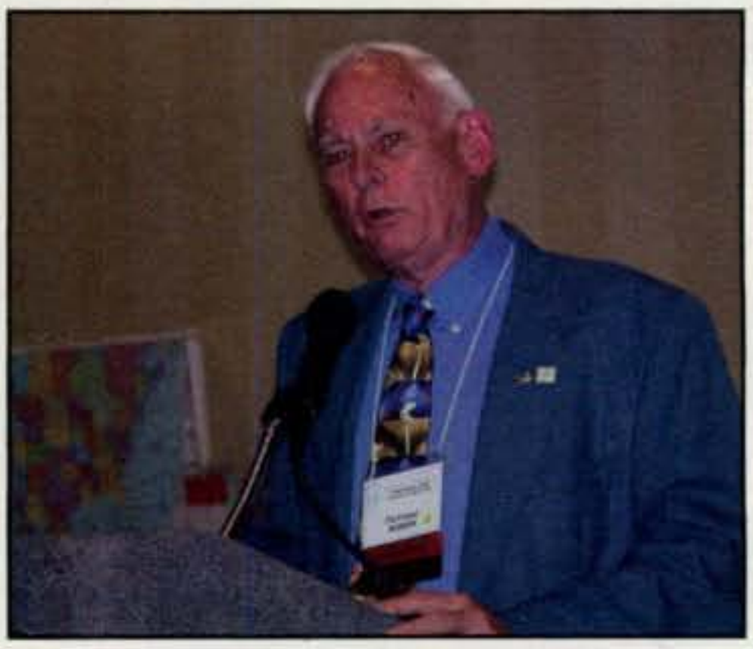
"My station works great as a minimal EME station. I have 170 watts out of the RF Concepts brick, and the GaAsFET preamp in the brick works well, as does the internal preamp in the FT-847. I seem to have adequate gain to decode just about anything I run across, except I have yet to decode myself. Regarding the small array, it is as broad as you can imagine. The major lobe is quite broad and the –3 dB lobes are 15 degrees off axis. I have actually used the side lobes to work stations when my range of azimuth runs into tower obstructions.

"The quad array of 5-element Yagis is compact enough to maneuver it by hand, and is pretty rigid to the blowing of the ever-present winds that strafe Ross Island. In my first month or so of operating, I have 12 complete QSOs, and a few failures usually on my end, and mostly from the weather, but also from others' weather woes as well. Murphy also affects the operation in other ways. For example, one German ham slept through his sked. However, I forgave him, and rescheduled him for May.

"Insofar as operating time on the Moon is concerned, I have usable Moon only 11 days of the month. For 13 days, the Moon is below the horizon; for the remaining other days, the elevation is not usable. Therefore, giving one-hour sked windows, this means that I have precious few hours to operate, and these available hours determine where I am going to sked. Mix into that agenda my work schedule, and such tasks as housekeeping, laundry, social events that I partake in, which includes the local amateur radio club (consisting of five members this winter), and you can see the restrictions that I am working with for my Antarctic EME DXpedition.

"Even so, I press on. For example, for the May Moon window, I had 18 confirmed schedules lined up and still had five more open slots for skeds as I write this piece. As you can imagine, the demand is high. Whenever I show up on the JT65 Logger (http://www.chris.org/cgi-bn/jt65eme) I am swamped for sked requests, which I try to deal with as best I can. For example, as I write this, the June calendar is already starting to fill up. Even so, this has been the most fun I have had in amateur radio for a very long time—and I have just started!"

Ernie Gray, KC4/W1MRQ, is located at McMurdo Station, Antarctica, in grid locator RB32hd. He can be corresponded with via e-mail at: <w1mrq@yahoo.com>. As you are reading this, Ernie has little time left before he must tear down his station and pack up to go home at the end of next month. Even so, he may have a couple of slots left in which to add Antarctica to your 2-meter EME DXCC count.



Southeast VHF Society President Ott Fiebel, W4WSR, greeting guests at the 2005 conference banquet.

SE VHF Society Conference Another Success

The last weekend of April brought nearly a hundred hams from across the southeastern part of the U.S. and beyond to Charlotte, North Carolina for this year's Southeast VHF Society Conference. They heard more than a dozen presentations related to the VHF+ ham bands. Among them were operating, technical, and construction papers. You can read most of the presentations in the *Proceedings* published in conjunction with the conference. Copies of the *Proceedings* are available from the society at its website, <http://www.svhfs.org>. At that URL click on the Printed Proceedings link.

This year's luncheon speaker was Steve Powlishen, K1FO, who is looking at relocating to the North Carolina area. The banquet speaker was ARRL First Vice President Joel Harrison, W5ZN, who had very complimentary things to say about *CQ*'s sister publication, *CQ VHF* magazine, as part of his opening remarks.

Next year's conference will be held in Greenville, South Carolina. More information will be posted on the society's website as it becomes available.

My wife, Carol, W6CL, and I represented *CQ* and *CQ VHF* magazines in the dealer area, where we had opportunities to visit with other dealers, among them Steve, K1FO, and Steve Kostro, N2CEI. Both Steves indicated that they had more business than they could handle, which is the opposite of what has been reported in general from the HF side of our hobby. It seems that the growth side of our hobby is on the VHF+ ham bands. A good way for you to support that growth is to become a subscriber (and even a contributor) to *CQ VHF*. For subscription information, please look elsewhere in this issue for an ad for the magazine. For more information on writing for *CQ VHF,* send me an e-mail at <n6cl@sbcglobal.net>.

Post Conference Travels

After the conference, based on my friend, Ted Goldthorpe, W4VHF's recommendations, Carol and I traveled to the Asheville, North Carolina area for a couple of extra days of vacation. From Asheville we traveled to Mount Mitchell, which is the highest peak east of the Mississippi. Ted and other serious VHF+ operators have used this location as a contest QTH on many occasions. It seems to be a magnet for hams, as we found out when we arrived on the summit, only to find amateur radio couple Ray Roberts, W4EJY, and his wife Joanne, K4EJY, already there. (There is something about ham couples and matching callsigns—hi.) Ray is active on 70-cm EME from his home in Callahan, Florida.

Carol and I subsequently toured the Biltmore Estate in Asheville and then stayed at the Mount Pisgah Inn, where the best mountain trout in the world is served at the restaurant. We really appreciate Ted's recommendations for our additional days of vacation.

The present observation tower atop Mt. Mitchell, North Carolina, the highest peak east of the Mississippi. Designed by Asheville, North Carolina architect Lindsey M. Gudger, this tower was completed in 1960. It provides a safer stairwell and larger observation deck than the previous tower. Between the sign and the tower, within the fenced area, is the grave of Rev. Dr. Elisha Mitchell, for whom the mountain was named in honor of his explorations. Mitchell lost his life on the mountain during his last exploration trip. (Mount Mitchell photos courtesy of N6CL)

On the Air

Julio Medina, NP3CW, reports the following 6-meter activity for April:

April 2, KP2BH, FK77. April 21, NW5E, N4KJP, KG4RWA, EL96; WA4DOS, EL96; K1UTI, EL86; NJ2F, EL96; KD4VRY, EL96; KD6PPN, EL96; KP4TB, FK78; KP4ED, KI4CIB, EL95; and WE2N. April 22, W4SO; KE4WBO; WP4DM; KD4FLP; W4IVW, EL97; W4LTJ, W4SO, and WI1S, EL99; as well as the following beacons: C6AFP/B, FL16; and K4AHO/B. April 23, KG4KVZ; and KC4PX, EL98. April 29, NP2L, FK78. Both days, April 22 and 23, the band was open early from 1 PM to around 8 or 9 PM, local time.

Current Contest

CQWW VHF Contest: This year's CQ WW VHF Contest will be held from 1800 UTC July 16 to 2100 UTC July 17. Complete rules can be found in the June issue of *CQ,* the Spring 2005 issue of *CQ VHF,* and on the *CQ* website, <www.cq-amateur-radio.com>.

The **Mid Summer Six Club Contest** is expected to be held from 2300 UTC July 15 to 0300 UTC July 17. These dates need to be confirmed by the sponsor. All logs are due 30 days from ending date of the contest and they go to <w4wrl@aol.com>. For further information go to: <http://6mt.com/contest.htm>.

Current Conferences

More than a conference, the fifth annual **Great Plains Super Launch** (GPSL) will be held July 1–3 in Omaha, Nebraska and hosted by Nebraska Stratospheric Amateur Radio (NSTAR). GPSL 2005 will bring together Amateur Radio High Altitude Ballooning groups to share information and participate in simultaneous flights.

Friday, July 1 will feature a conference covering technology, techniques, and accomplishments in the community. The Super Launch on Saturday morning will involve several simultaneous flights that will be launched, tracked, and recovered all within a few hours. Sunday is the alternate flight date if Saturday's weather is unfavorable.

Amateur Radio High Altitude Ballooning uses lightweight balloon-borne payloads that are tracked by radio, recovered, and then reused on future flights. Payloads usually contain GPS receivers and report position to ground stations using amateur radio APRS (Automatic Position Reporting System). Payloads can also include cameras, scientific instruments, and radio equipment for communications experiments. Many ballooning groups fly student-designed experiments as part of their missions.

Flights frequently achieve near-space altitudes of 80,000 feet or higher and endure very cold temperatures, often lower than –70°F, and atmospheric pressure less than 1% of that at the Earth's surface. Flight distance can vary from a few miles to several hundred miles, depending on winds aloft, and the flight's path is predicted before launch. Amateur Radio High Altitude Balloon flights in the U.S. adhere to FAA regulations for unmanned free balloons.

Participation in GPSL 2005 is open to everyone interested in Amateur Radio High Altitude Ballooning regardless of experience in either amateur radio or ballooning. Updated GPSL 2005 info will be posted at <http://www.superlaunch.org/>. Direct questions to Mark Conner, N9XTN, via <n9xtn@cox.net>.

This year's **Central States VHF Society Conference** will be held in Colorado Springs, Colorado July 28–31 at the Sheraton Hotel, Colorado Springs. For more information, please see: <http:// www.csvhfs.org>.

Current Meteor Showers

July: This month there are a number of minor showers. The most intense, the *delta-Aquarids,* is a southern latitude shower. It has produced in excess of 20 meteors per hour in the past. Its predicted peak is around July 28.

August: Beginning around July 17 and lasting until approximately August 14, you will see activity tied to the *Perseids* meteor shower. Its predicted peak is around 1700–1930 UTC August 12.

For more information on these and other meteor-shower dates, please see <http://www.imo.net>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings,* or both. For more

Ray Roberts, W4EJY, and his wife, Joanne, K4EJY, converse with Carol Lynch, W6CL, in the Mt. Mitchell summit parking lot.

Margelli, Miller Mash Messaging via 432 MHz

It was a contest between two of the top cell-phone text-messaging whizzes, Ben Cook and his friend Jason, and two top amateur radio licensees who are excellent CW operators, Chip Margelli, K7JA, and Ken Miller, K6CTW. The contest, which aired on the May 13th *Tonight Show*, presented the CW operators trouncing the text-messaging experts in sending and receiving a previously unknown message. The message was a slight variant of GEICO Insurance Company's advertising slogan, "I just saved a bunch of money on my car insurance." The contest was part of the show's segment in which audience participants predict the winner between two competitors in order to win a prize of free dinner at a sponsoring restaurant.

In this competition the two contestants were the team of the casually dressed (T-shirt and jeans) cell-phone text-messaging champ and his partner, and Chip and Ken, who were decked out in attire that was a cross between an old-time telegrapher and a card dealer. As viewers to the segment witnessed, despite the audience's prediction to the contrary, the Morse code experts easily won the contest.

With Chip being one of the amateur radio contestants, naturally there had to be a weak-signal VHF connection. Chip and Ken used two Yaesu FT-817 radios, one that belonged to Chip and another supplied by Dan Dankert, N6PEQ, a weak-signal VHF operator in the Orange County, California area. The object of the contest was to transmit a message over the air via the respective (cell phone and amateur radio) wireless spectrum. Being the good weak-signal VHF enthusiast that he is, Chip made sure that their radios were tuned to 432.200 MHz.

It is important to note, however, that the radios were props. While it appeared that Chip and Ken were in contact with one another, no QSO actually took place. Chip's transmissions were into a dummy load, so as to not radiate out of the immediate vicinity of his station setup. In spite of this provision, the close proximity of the two radios made it possible for Ken to easily hear Chip's weak-signal CW transmission and thereby copy the message.

Knowing that he would have major exposure at the Dayton HamVention® the following week, Chip also knew that he had a lot riding on his successfully transmitting the message. As viewers who could copy Morse code heard, he did so flawlessly.

In an interview with your editor, Chip commented that while he has sent and received Morse code for decades—even in some pressure-filled situations—he had never done so in front of millions of viewers. He also was fully aware of the ramifications of his failing to win the contest, particularly among the fellow amateur radio operators with whom he would have contact at Dayton. The coolness with which Chip performed proved that he was most qualified to carry out the task.

Those who watched the segment got to view Chip successfully and flawlessly send the message at approximately 30 wpm. At the end of the transmission the camera focused on Ken beaming as he raised his hand indicating that he had received the message, while Jason, of the text-messaging team, looked on with an expression of shock and bewilderment.

Chip blew on his thumb and finger, making it appear that he was trying to cool them after having sent the Morse code at such a high rate of speed. His antics proved that not only is he a great ham radio operator, but also a great ham for the small-screen camera. Perhaps before long Chip will need to hire an agent and join AFTRA (the American Federation of Television and Radio Artists union) or SAG (the Screen Actors Guild), for subsequent television appearances!

How was it that Chip and Ken found themselves in front of millions of viewers on the *Tonight Show*? It all goes back to the success of Gordon Hill, the 93-year-old Australian telegraph operator who easily defeated his 13-year-old text-messaging rival, Brittany Devlin, in a contest which was sponsored by, and took place at, the Powerhouse Museum in Sydney, Australia, in mid-April 2005. Those contestants had to transmit the following message: "Hey, girlfriend, you can text all your best pals to tell them where you are going and what you are wearing."

That contest created such a buzz within the amateur radio community that it caught the attention of the *Tonight Show* and subsequently the show's star, Jay Leno, who felt that such a competition would be an appropriate contest for the show. Eventually Chip and Ken were contacted and recruited for the May 13th show—and the rest is history. Well, maybe not, because your editor is hoping to have an article that tells the rest of the story in a future issue of *CQ VHF* magazine. We will keep you posted.

Chip Margelli, K7JA, outside the studio where the Tonight Show *is taped.*

information, questions about format, media, hardcopy, email, etc., please contact the person listed with the announcement. The following organizations or conference organizers have announced calls for papers for their forthcoming conferences:

TAPR/ARRL Digital Communications Conference: Technical papers are solicited for presentation at the 24th Annual ARRL and TAPR Digital Communications Conference to be held September 23–25 in Santa Ana, California, and for publication in the conference *Proceedings.* Presentation at the conference is *not* required for publication. Send papers by August 9th to: Maty Weinberg, ARRL, 225 Main St., Newington, CT 06111; or via the internet to: <maty@arrl.org>.

Microwave UpDate: The following is via Chip Angle, N6CA, Technical Program Chairman: The 2005 Microwave UpDate will be held this year in the Los Angeles area October 27–31. Interested authors are invited to present a paper(s) for the 2005 conference. You don't have to give a talk to have your paper included in the conference Proceedings. Electronic submissions in Word, WordPerfect, or text format accepted by e-mail or CD. Usual drawing formats also accepted with paper(s). Cutoff date for inclusion in the *Proceedings* is September 5. Send an e-mail or write to: Chip Angle, N6CA, P.O. Box 35, Lomita, CA 90717-0035; e-mail: <n6ca@ham-radio.com>. Contact Chip as soon as possible with an abstract or a general idea to help the conference plan activities. Details go to: <http://www.microwaveupdate.org.>

And Finally . . .

I hope to see some of you at either the Great Plains Super Launch or at the Central States VHF Society conference. As I mentioned earlier in this column, it is the VHF+ segment of the hobby that really seems to be growing. Please send me your stories so that I can write about you in a future column.

Until next month... 73 de Joe, N6CL

BY JOHN DORR,* K1AR

No Room for Towers?

July's Contest Tip

Have you ever called a station in a contest only to have them CQ right in your face? Many times there are good reasons why this happens (e.g., bad RX conditions or local QRM). However, if the situation just doesn't make any sense, it could very well be that the problem is on your end. You may have an audio problem or have left your transceiver in split mode, or your RIT/XIT has unintentionally been left on. In any event, don't waste precious time calling a loud station that should be coming right back to you. More often than not, a simple check will ensure that QSO makes it into your contest log.

Calendar of Events

June 18	Kid's Day Contest
June 25–26	ARRL Field Day
June 25–26	Marconi Memorial HF Contest
June 25–26	His Majesty of Spain SSB Contest
July 1	RAC Canada Day Contest
July 1–2	Venezuela Independence Day Contest
July 9–10	IARU HF Championship Contest
July 16–17	**CQ WW VHF Contest**
July 16–17	North American RTTY QSO Party
July 23–24	Great Lakes Sweepstakes
July 30–31	RSGB IOTA Contest
Aug. 6	European HF Championship
Aug. 6–7	ARRL UHF Contest
Aug. 6–7	North American CW QSO Party
Sept. 24–25	**CQ WW RTTY DX Contest**

Perhaps the majority of hams who are interested in contest operating believe that if you don't have a huge antenna farm with big towers, you can't be competitive. To be fair, there aren't many winners who don't have a representative amount of hardware to back up their scores. However, the fact is, most hams don't have the resources, zoning regulations, or family support on their side to allow for huge antennas. If you're in that category, don't give up hope; there is light at the end of the tunnel.

It's no secret that there has been a steady climb in the requirements needed to have a winning contest station. When I had my first contest station in Billerica, Massachusetts during the early 1980s, I was able to win the CQ WW and ARRL DX contests a few times with a single tower and one radio. Of course that tower was loaded with beams, but it would not hold a candle to the likes of today's K4ZW, K5ZD, N2NT, N9RV, and other notable single operator stations. Also, as has often been discussed, it didn't hurt in those days to be located in New England, either.

Thank You for Trees

One of God's greatest inventions for the towerless ham is the tree. A simple, growing stick in the ground, trees have supported more antennas over the years than any number of towers or other man-made structures. If you think back to your early ham days, I am willing to guess that your first antenna support was not a tower, but a few trees in the back yard. The good news is that what was essential for us those many years ago is still a key staple of antenna construction today.

In fact, I can claim personal experience with my friend the tree. When I'm not contesting from a big contest station, I operate at home using an 80-meter dipole fed with ladder line strung up about 60 feet in the air. Amazingly, it really works. Not only do I use it for DXing, but it has become my contest antenna as well when I feel like operating in smaller contests from the home QTH. Am I weaker than others with big beams in the air? You bet I am! However, it can still be fun, and with the right combination of antenna angle and conditions, amazing results can be achieved. I'll never forget the 165 QSO/hour rate I had in one of the ARRL 10 Meter contests on CW running only 100 watts. That was a good example of what is possible.

Wire antennas can indeed be a great way to deal with the lack of towers and traditional Yagis. Perhaps the best example of all is the station of Phil Allardice, KT3Y, who has amassed an amazing contest setup in northern Virginia using only wire antennas—and lots of them. Phil's antennas include a combination of fixed wire beams and dipoles, a few lazy H's, and even stacked wire Yagis on 15 meters. Just to put it in perspective, I took a brief look on the 3830 internet site and saw one of Phil's CQ WW WPX CW scores from a few years ago. He nearly broke 6-million points with approximately 2700 QSOs! I'd say that's pretty cool.

There are Other Solutions

In addition to lots of wire and rope and an eagle eye when using the slingshot, another alternative is Field Day style antennas. Now bear in mind that my home QTH situation is entirely driven by lack of motivation. With four acres and a tower-friendly town, there's really no excuse for the K1AR station to be lacking in towers. However, it has occurred to me that another solution for others is to put those horizontally oriented towers to use on a temporary basis for selected weekends. While you may not be allowed to erect a permanent structure for any number of reasons, I'd be willing to guess that you could put up 60 feet of tower for a weekend here or there and get that "Field Day" setup going. It's not ideal, but it will work if you have the interest and motivation.

There are also a growing number of hams who are erecting fixed Yagis on the tops of trees with a healthy measure of daring, planning, and help from others. Again, having a simple 3-element Yagi on 20 meters at 50 feet pointing toward Europe won't win a contest, but it sure can give you the signal you need to have a good time in the next contest.

For those of you who have local zoning restrictions, a growing number of "stealth" products are being brought to market. Check out: <http://www.ac6v.com/antprojects.htm#STANT> for a good

*2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

Visit Our Web Site

Clarification: CQ DX Marathon

We were reminded after publication of the rules for the new CQ DX Marathon (May 2005 *CQ*) that the CQ World Wide DX Contest has a slightly different countries list than the CQ DX Award, and gives separate country credit for certain locations that are not on the CQ DX Award/DXCC countries list. Since the DX Marathon is a contest rather than an award, the CQWW countries list will govern determination of country credit. Therefore, Rule 4 (Scoring) is revised to read as follows:

4) Scoring: Each country worked is worth one point. Each CQ zone worked is worth one point. The total score is the sum of zones and countries worked, on any mode and any authorized band. There are no multipliers of any kind. Each country and zone count only once. If in the course of the year you work 238 countries and 37 zones, your score is 275. If you work all 40 zones and 150 countries, your score is 190. The **CQ World-Wide DX Contest** Countries List and the CQ Zone List constitute the official lists. In the case of ties, the operator whose last scoring contact was earlier chronologically will be judged the winner. Decisions of the Marathon Manager are final.

In addition, for the sake of consistency with our other contest rules, we are amending the rule regarding high power to specify a maximum power output of 1500 watts. Rule 3 (b) will now read:

b. Unlimited: Any antenna may be used, along with any power level for which the operator is licensed, **not exceeding 1500 watts total output power on any band.** As in the Formula class, all contacts must be made without assistance of any sort, including but not limited to lists and passes. Use of spotting nets such as a DX Cluster® is allowed.

list. You'll never take over the ham world with any of these, but you will be able to get on the air. Speaking of semi-stealth antennas, I remember many years ago, while living in El Paso, Texas as K1AR/5, using an 80-meter dipole strung between some trees right outside our apartment window. While hardly a true stealth arrangement (especially considering I ran a KW for many QSOs), it did get me on the air. The funniest incident of all was when the center insulator arced over one evening and caught on fire while I was calling K1MM on the Spratly Islands. A neighbor came running to the door to let me know that I had a fire outside my window and that we should call the fire department. Well, needless to say, the future days of that antenna were numbered, especially when the apartment complex manager suggested I take it down—and fast! Fortunately (perhaps more for my neighbors), we moved a few weeks later.

Specialization is Another Interesting Strategy

If you just don't have the real estate or interest in putting up antennas for all bands, you may want to consider specializing in one or two bands. The low bands are excellent candidates for this approach, where one can erect a 4-square and various other supporting antennas to create a really loud and interesting low-band station. Again, provided you have the trees and real estate, an 80-meter 4-square can be a real "killer" antenna, especially at this point of the sunspot cycle. A fixed wire Yagi on 40 meters combined with some vertical antennas is also a great combination. Anyone who has done mono-40 meters in a DX contest can attest to how much fun that can be. The point is that there is plenty of other contesting to do besides all-band operating.

Antenna Resources

Beginning with the internet itself, there is a wide range of resources that will help you learn about more esoteric wire antennas. One excellent source on the internet is AC6V's site, which can be found at: <http://www.ac6v.com/antprojects.htm>. On the book front, there are many excellent publications. I'd suggest one or more of the following:

- The *ARRL Antenna Handbook*
- *ON4UN's Low Band DXing* (new edition just published)
- *The Radio Amateur Antenna Handbook,* by W6SAI

Hams have always shown resourcefulness and innovation. When it comes to our getting on the air, we always make it happen. Contesters are no exception. So the next time you feel depressed about your lack of big towers and antennas, take solace in knowing you're far from being alone. Instead, take the offensive, maximizing what you have, and get on the air. There is room in contesting for everyone.

Final Comments

Don't let the fantastic summer weather get away from you. Now is the time to erect and test those new antennas for the fall contest season. In the blink of an eye, the leaves will be turning!

That's it for this month. Even though the solar conditions are poor, there's always something interesting to do on the air. See you in the next contest!

73, John, K1AR

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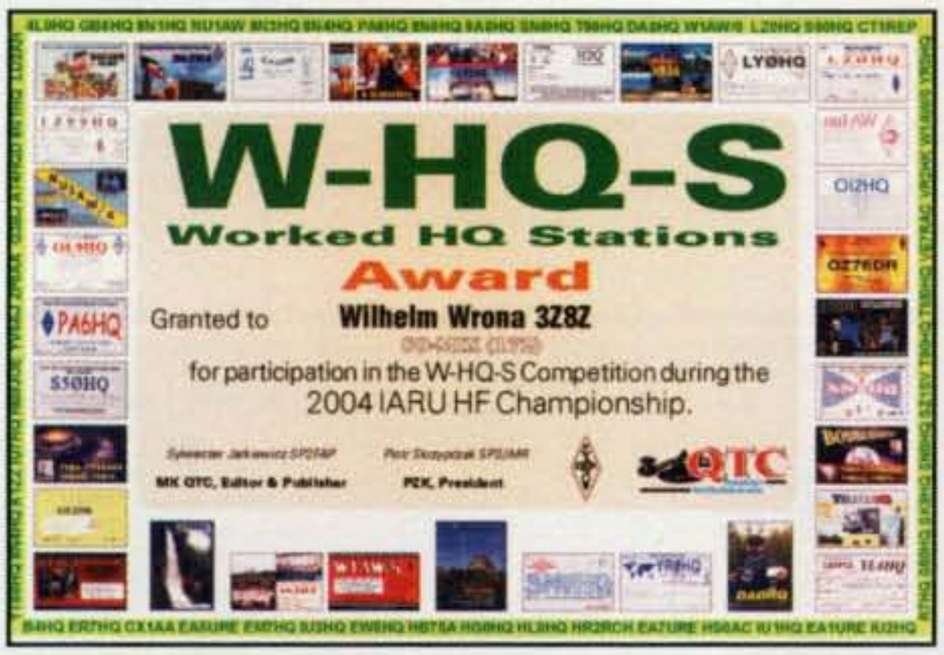
BY TED MELINOSKY,* K1BV

Ghost Counties

"You're 59 in Cotaco County, Alabama. Over!" If you heard this exchange on 14336, you'd probably fall out of your seat while grabbing the microphone and shouting something about pirates or deliberate interference. "There's no such county!" However, if radio had been invented in the 1800s instead of the 1900s, it might have been a fact.

Cotaco County was created in 1818 and named for an Alabama Indian chief. However, it was renamed Morgan County in 1821 and Cotaco joined the early ranks of "Ghost Counties," which existed as valid geographical and political entities of the United States but are now just memories. Most states have ghost counties. While America was growing, many counties combined with or split into multiple counties. There is an interesting internet article that chronicles each of these long-forgotten entities; go to: <http://barusa.tripod.com/ghostcounties/>.



The Polish amateur radio journal MK-QTC *is offering this certificate for contacting IARU member country official stations during the IARU HF Championships contest, July 9–10, 2005.*

Short-Term Award

The Polish amateur radio journal *MK-QTC* is offering a beautiful, multi-colored certificate for contacting IARU member country official stations during the IARU HF Championships contest, July 9–10, 2005. The Worked HQ Stations Award (WHQS) is for those who make the greatest number of two-way contacts/heard stations with:

a. IARU member association stations. They will give a signal report and the abbreviation of the organization they represent, such as 599RAC (Radio Amateurs of Canada), 599JARL (Japanese Amateur Radio League), etc.

b. NU1AW (e.g., 599IARU).

c. Members of the IARU Administrative Council (e.g. 599AC).

d. Members of the executive committees of the three IARU Regions (e.g. 599R1).

For the award you may work headquarters stations once per band and mode, which allows you to contact the same station on six HF bands CW and SSB, for a maximum of 12 times.

Award Categories: Single Operator All Band CW, Single Operator Single Band CW, Single Operator All Band SSB, Single Operator Single Band SSB, Single Operator Mixed, Multi-Operator Single Transmitter Mixed, (G) Single Operator SWL Mixed.

Send application with log extract on or before July 31, 2005 to: The Radio Amateurs' Journal MK QTC, ul. Wielmozy 5b, Suchacz-Zamek, 82-340 Tolkmicko, Poland; e-mail: <qtc@post.pl>.

Competition Awards will be issued to the three top contesters in each category. Participation awards will be issued to the remaining contesters. The award is free of charge, but applicants are asked to please send $US5 or 5 Euros to cover postage costs. Questions may be sent to <qtc@post.pl>.

DX Awards

Chile's Zone 12 Award. Chile has long been known for its natural resources, especially copper. The award plaque portrays a stylized condor over a shield representing CQ Zone 12. The award is relatively easy to earn and reasonably priced and will be a handsome addition to your shack.

The Zone 12 Award is sponsored by the Radio Club of Chile for contacting any 12 different CQ Zones, making sure that one of them is Zone 12 in

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Ed Wojtowicz, K8QWY
USA-CA All Counties #1119
April 21, 2005

USA-CA Honor Roll

500
4X4PP.....3347
K8QWY.....3348

1000
WA2VQV.....1691
K8QWY.....1692

1500
K8QWY.....1415

2000
K8QWY.....1310

2500
K8QWY.....1231

3000
K8QWY.....1141

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

The Zone 12 Award is sponsored by the Radio Club of Chile for contacting any 12 different CQ Zones, making sure that one of them is Zone 12 in Chile.

The Irkutsk Award Group sponsors the Cities of Russia Awards for contacts made after January 1, 2005.

Chile. GCR (General Certification Rule) list accepted, and it should be certified by an officer of a recognized club or national radio organization/IARU member society. Fee is $US15 for Chilean applicants and $US20 for all others. Apply to Awards Manager, Radio Club of Chile, Casilla 13630, Santiago de Chile, Chile.

Cities of Russia Awards. Russia is a gigantic land mass crossing multiple time zones. There are over 1000 cities in this country. The Irkutsk Award Group would like radio amateurs to become more familiar with Russia. To this end the group sponsors the Cities of Russia Awards for contacting these cities on or after 1 January 2005. The group's website contains a list of valid cities for the award, and you may want to print a copy of this list and keep it handy for when bureau QSLs arrive.

The basic award requires only 100 cities, but additional awards for contacting up to 1100 cities are available. While checking for new cities, don't forget that most of the cards will count separately for the Russian Districts Award (RDA). Both of these awards add a delightful level of complexity as compared to the "good old days" when award hunters just had to worry about completing 100 Russian "oblasts."

General requirements: Issued by the Irkutsk Award Group to amateurs or SWLs for contacting cities of Russia on or after 1 January 2005. Endorsements available for any single band, HF or VHF, or for any single mode. Special endorsements available for contacts made by satellite, QRP (< 5 watts), or QRPp (< 0.5 watt).

Contacts with areas having city status at the time of the QSO are counted. Contacts with ground stations, including mobile or those on rivers and lakes, are valid. All contacts must have been made from your same callsign area, or if your country does not have call areas, then from the same country.

Application must include QSO data, callsign, date, band, mode, and the name of the Russian city and its respective number. Send GCR list and fee of 10Euros (plaque is 35 Euros) to: Arkady Erbaev, RZØSB, P.O. Box 1224, Irkutsk 664033, Russia (e-mail: <rz0sb@angraa.ru>). The list of eligible Russian cities and the official application form can be found at <http://www.cora.irk.ru/en/index.html>.

CORA100–1100. For the Cities of Russia Award contact (SWL okay) amateurs in at least 100 cities of Russia. Separate awards are issued for 200 through 1100 cities.

WACORA. For the Work All the Cities of Russia Award work each of the cities of Russia. The award is a wood plaque.

Massachusetts Counties Award

A few months ago in this column I listed the U.S. states that did not yet offer a "Worked All Counties" award, adding that it would be a great club project (hint, hint!). Thirty-one states now offer such an award (Indiana is about ready to join the group as well).

DX ENGINEERING
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Saratoga EZ-PSK Interfaces
New!
• No jumpers—just plug in and go
• No external power required
• Sound card interface for digital mode operation
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• USB interface versions also available
• All packages include CD with HamScope & Digipan software
EZ-PSK, Icom 706/703 ..... SALE! only $39.95
EZ-PSK, Non-USB models $43.95
EZ-PSK, USB models $73.95
See DXEngineering.com for more details!

RFI Suppression Beads
• Reduce or eliminate ignition/injector noise
• 3 S-units improvement not uncommon!
• Hear many more stations
• New 31-mix is optimal for HF
• Special large-mass beads
• Snaps on—no cutting
• Mobile or home use—any RFI application
DXE-CSB-275P Up to 0.275", 10-pack $23.25
DXE-CSB-525P Up to 0.525", 5-pack $22.25
DXE-CSB-750P Up to 0.750", 5-pack $25.80

HOT WYRZ™ Shortened Multi-band Antenna
New!
• Lightweight design
• 3.5 through 30 MHz
• Works on Ham and SWL frequencies
• 74 feet long—no coils—linear loaded elements
• Works best with 4:1 balun (in-tuner or separate)
Patent Pending
• UV-rated polymer insulators
• Includes center and end insulators, stainless steel hardware, 100 ft. stranded 300 Ohm feedline, 100 ft. Dacron guy rope
DXE-SWA-070 ..... $75.95

Stainless Saddle Clamps
Available in nine sizes ranging from 0.5" to 3.0".
• 18-8 stainless steel U-bolt
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• Exact fit to tubing sizes
Complete dimensions available on our website.
Starting at just $3.99!

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H. Troy Warren, K5OH, USA-CA All Counties #1111

My interest in radio and electronics began in 1952 in the Army due to an assignment as a Wireman in the Communications Section in an Anti Aircraft Artillery unit. As a very young corporal my off time was spent listening to ham and shortwave broadcasts on a Hallicrafters receiver that I acquired while stationed in Germany. After returning to the United States, I was fortunate enough to attend the Communications Chief School at Fort Sill, Oklahoma, which further increased my interest in radio communications. I later attended and graduated from the 10-month enlisted Radar Maintenance School at Forth Bliss, Texas, which further increased my interest in electronics.

After graduating from OCS in 1958, I was assigned as a Radar Platoon leader of a Nike Ajax unit in the Washington/Baltimore air defense system. After completing the Army Helicopter flight school in 1963, I was assigned to Fort Sill, Oklahoma, where I met some hams from the Lawton/Fort Sill Amateur Radio Club. After attending the club's Novice training course and passing the Novice test in August 1965, I received my first callsign, WN2EEK. I built my first transmitter, which was a Heathkit DX-60. My receiver was a Hammarlund HQ-110.

After getting my Novice ticket, I received orders for Korea. My operating in Korea as HL9TW consisted of AM and CW QSOs with a multiband dipole. After returning to the United States in 1966, my Novice ticket was close to expiring (one year). I had been studying the General class material while in Korea, so I decided to go to the FCC headquarters office in Washington, DC and take my General class exam (talk about pressure!). I passed the exam, which was fortunate, because my Novice ticket was due to expire a week later.

After acquiring my General ticket and my WA3EEK callsign, I decided I needed a new radio, so off I went in search of a one. I found a local ham store and fell in love with a spanking new Drake TR-4. I soon had this beauty in my possession, along with an MS-4 speaker, AC-4 power supply, and the DC-3 mobile power supply. I decided on a Webster Bandspanner mobile antenna, which I promptly installed on my almost new 1964 Oldsmobile 98, much to my wife's dismay. One of the my first significant mobile contacts was with the Geodetic Survey Team on the North Pole. I still have the TR-4 today and it still operates and looks like new.

H. Troy Warren, K5OH, USA-CA All Counties #1111, January 29, 2005.

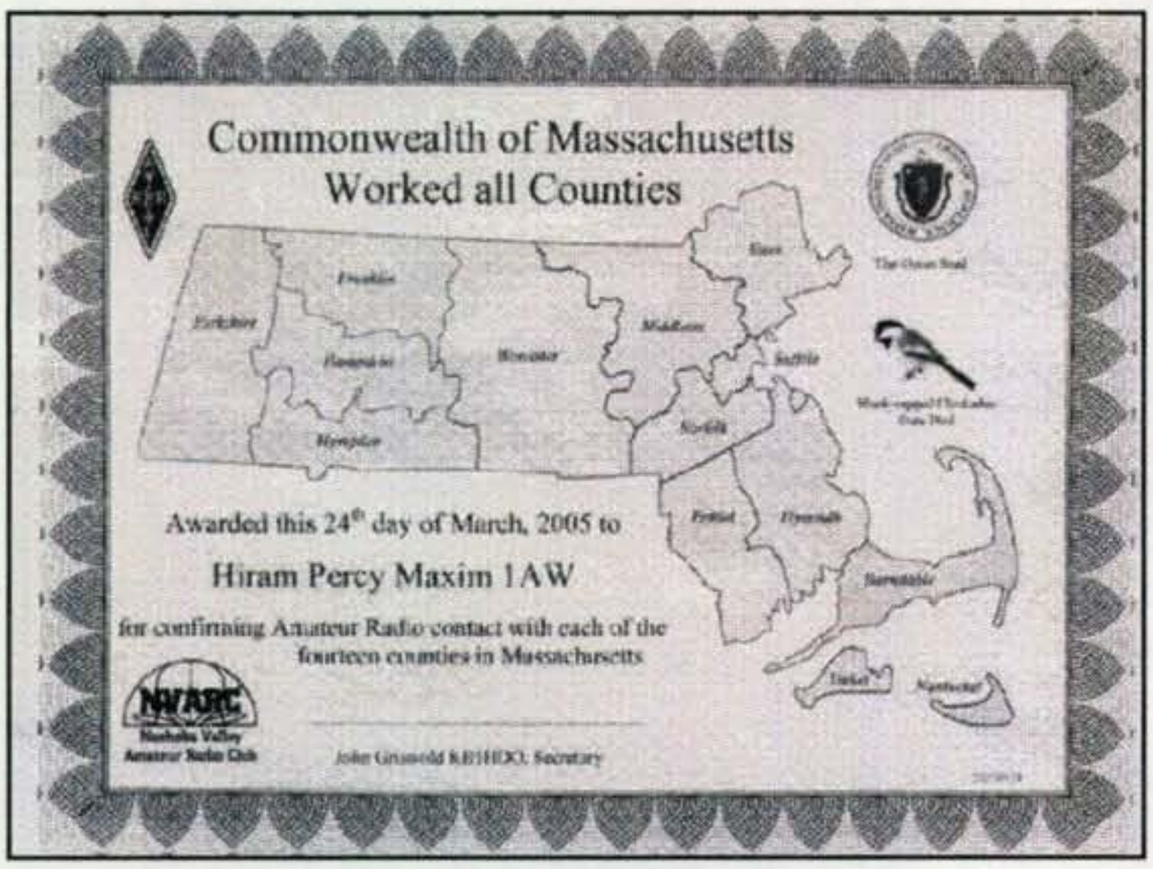
After a tour in Vietnam in 1968, my family and I were sent on assignment to Germany. I liked the TR-4 so much that I purchased a complete Drake B Line to include the L-4B. I had become active in the MARS program in 1967, so I set up a class A MARS station with a Collins S-Line, acquired from the military system, and a two-element quad antenna that I built out of bamboo and wire. My German callsign was DL4WA and my MARS callsign was AE1WA. The station ran thousands of phone patches from soldiers stationed there to their families back in the United States.

We returned to the U.S. in August of 1971, and I operated here as WA3EEK until we were assigned in 1972 to a hardship tour in paradise (portable KH6). I decided to upgrade to Extra class after returning from Hawaii in 1975, so I went to Dallas and took the test and then got the callsign KE5K.

I became interested in Slow Scan TV in the early 1970s and operated a lot of SSTV from Korea and the U.S. I retired from the Army in 1982 and for seven years worked as a Computer Field Engineer for Norden Systems, which is a subsidiary of United Technologies. After that I worked as a Computer Software Tester for Telos Systems in Lawton, Oklahoma until I hung it all up in 1996. Now I can enjoy my two hobbies—ham radio and old classic cars. When the Vanity callsign program was implemented, I decided I wanted a 1×2 callsign, so I applied and was granted the call K5OH.

I became interested in county hunting in March 2001 thanks to a local county hunter. He told me it could become addictive, and he was right. I have been to a few of the county hunter mini conventions as well as a national convention in Weslaco, Texas. I was really impressed with all of the county hunters and was made to feel quite welcome.

I attained UCA-CA All Counties #1111 on January 29, 2005, and I am looking forward to trying for the seond-time-around award and possibily other awards. My station can be seen on <www.qrz.com>.—*73, K5OH*



To earn the Worked All Massachusetts Counties Award, sponsored by the the Nashoba Valley Amateur Radio Club, contact stations in all 14 Massachusetts counties.

The Nashoba Valley Amateur Radio Club in Massachusetts has just finalized its award. Note below the very generous starting date for contacts. To earn the Worked All Massachusetts Counties Award contact stations in all 14 Massachusetts counties. Within the U.S. all contacts must have been made from one county; from outside the U.S. contacts must have been made within the same country. No use of repeaters or digipeaters allowed. Satellite QSOs are okay. All bands and modes. No contacts made prior to December 21, 1620 count for the award. Refer to the website listed below for the application form. Send application and fee of $US5 (stations outside the U.S. $US6) to: Nashoba Valley Amateur Radio Club, P.O. Box 900, Pepperell, MA 01465; <http://www.n1nc.org/WAMC/WAMC.htm>.

In Closing . . .

If your club or special-interest group needs publicity for a new or existing awards program, please send me the details via letter or e-mail. Publicity is the key to success for any awards program, and *CQ* magazine will be glad to help.

73, Ted, K1BV

Listening, Patience, and Timing

BY CARL SMITH,* N4AA

After a long, difficult winter season on the U.S. east coast, as I write this in early May, we are finally seeing some warmer seasonal temperatures without the snow, ice, and everything else that goes along with that. Actually, other parts of the country have had more than their share of the wintry weather, too, but here in the southeast we're just not used to it lasting so long.

There was a bit of a surprise in early May as the solar flux moved above the 100 mark and stayed there for several days. I didn't notice a lot of difference in propagation on the higher HF bands, although there were a few bright spots, such as TZ9A showing up on 12 meters. I'm still having fun working the WARC bands and learning more about how to work DX on RTTY. It's put some "passion" back into DXing for me after chasing the conventional bands for so many years. Also, with only 100 watts and admittedly compromise antennas, I've still managed to put together respectable totals on 30, 17, and even 12 meters over the past nine months. My RTTY activity has been sporadic, but even there I've been able to work some interesting DX with just 50–75 watts.

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

Lynn, W4NL, from Maryville, Tennessee recently decided to replace some coax at his station. Lynn is a QRPer and needs to get every watt to his antennas. He acquired some 1 5/8-inch hardline to run several hundred feet from his house to the tower(s). Not wanting to leave it exposed on top of the ground, he rented a Ditch-Witch. A couple of local DXers came by to see what was going on, and soon they wanted to try it for themselves. Here we find Don, W4TO, cutting the trench while Bobby, K4VE, watches to learn the finer points of using such a tool. Lynn put the cable in the trench and then backfilled it himself. (Photo courtesy of Lynn, W4NL)

All of this activity just reminds me that it takes patience, but patience eventually does pay off. Many times I've called and called with no results. Finally, though, when a pile-up dies down a bit, and with some "experience"-driven operating techniques, I usually make the contact. Most of it comes down to *listening* and timely calling. Remember, the operator on the other end can't hear you if he is transmitting, and you have to *listen* to know when to call. So many times I hear "people" (can't really call them DXers) calling and calling and calling. It makes me wonder if they hear the DX station at all, or if they are just calling "blind." It doesn't make a lot of sense to jump into a pile-up if you can't even hear the DX station, does it?

OH2BR/VP6BR
A Guinness World Record

Some time ago, I had the pleasure of writing a letter to the Guinness organization attesting to the record-setting accomplishment of Jukka Heikin-

"David & Goliath" is what Charles, S9SS, labeled this photo. In the foreground is his ham radio tower with a new SteppIR® beam. In the background is "Goliath," the reason why Charles is in Sao Tome. He is station manager for the broadcast station there. (Photo courtesy of Charles, S9SS)

The WPX Program

CW

3153 .....RUØLL

SSB

2932 .....RL3AA 2933.....EW1ABF

Mixed

1955.....WV1K

CW: 600 RUØLL. 800 CN2PM. 1050 DL5DBH. 2100 EA7AAW. 2900 W2ME
SSB: 600 KT2C. 700 SV1EOS. 1000 IZØBNR. 1700 W2ME.
MIXED: 2400 K9UQN. 3150 W2ME. 4700 K9QVB. 5450 W2FXA..

10 Meters: RUØLL
15 Meters: RUØLL, N1SHM
20 Meters: RUØLL
40 Meters: RUØLL, IZ3ZSK
80 Meters: RUØLL
169 Meters: RUØLL

Asia, Africa, No. America, So. America, Europe, Oceania: RUØLL

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

5 Band WAZ

As of April 1, 2005, 677 stations have attained the 200 zone level and 1451 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

UY5BA UR5BO DJØMDR K9RJ

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N4PQX, 199 (26)
JA5IU, 199 (2)
N6HR/7, 199 (37)
CT3DL, 199 (26)
NØIJ, 199 (21)
VE3XN, 199 (26)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
RU3DX, 198 (1, 6)
OE2LCM, 198 (1, 31)
W7SX, 198 (18, 23)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
HA9RT, 198 (1, 31)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
RX9TX, 198 (2, 6)
F5NBU, 198 (19, 31)

The following have qualified for the basic 5 Band WAZ Award:

UY5BA (200 zones)
KU4J (191 zones)
UR5BO (200 zones)
K9RJ (200 zones)
DJØMDR (200 zones)
W2YE (182 zones)
WB9EEE (197 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

heimo, OH2BR, for his 56,239 QSOs from Pitcairn Island between January and April 2000. Jukka has now received a certificate acknowledging his record for "The most QSOs made by an individual from one location in a year." Congratulations, Jukka!

DX Short Stories

I recently received a couple of short stories about DXing. I thought I would share these with you this month. The first is from Rob, WK3W:

Why I Love Low-Power DXing with Wires

It was a little before 7 AM on Thursday, April 21st, and I just did not feel like working out. So I got on the radio for a quick listen before going to work. I started on 30 meters and heard nothing until a local at 10.117 shot back to a station "vy loud lp" (long path). They signed without the DX call. I dropped in my call twice expecting nothing, since the signal from my Omni VI Plus and a 25-ft. high dipole is not exactly a pile-up buster. The DX station came right back and gave me a 569, which I reciprocated. He then signed: "VQ9LA."

Cool, lp for 14+K miles. Now I know why I love CW. Going to work that day was easy.—*Rob, WK3W*

The second is from well-known CW DXer Roger Western, G3SXW:

Every Second Counts

Tuning the bottom of 40 metres one evening, I heard "CQ FT5XO" at 30 wpm. He was weak. Wow. He had evidently just started on the band. It was a clear frequency.

Panic! Every second really counts in these circumstances. Calling on a clear frequency

A few of those who attended the International DX Convention in Visalia this year. Left to right are Bob Allphin, K4UEE; Nellie, XE1CI; Mike, W5ZPA; and Al, K6RIM. (Photo courtesy of Lenny, K5OVC)

The WAZ Program

10 Meter SSB

571 .....W3TC

20 Meter SSB

1137.....RWØCF

12 Meter CW

48 .....K4XG

15 Meter CW

326.....N7XM

17 Meter CW

58 .....K4XG

20 Meter CW

553.....N7XM

30 Meter CW

65 .....DJØMDR
66 .....WA7FKV
67 .....N7XM

40 Meter CW

245.....N7XM

80 Meter CW

66 .....UY5BA
67 .....UR5BO

160 Meters

204 .....N4MM (30 zones)
206 .....UR5BO (30 zones)
207 ...IK2DFZ (40 zones)

All Band WAZ

SSB

4960 .....JAØNY
4961 .....EA2AOS
4962 .....CT3IA
4963.....SV8CKJ

Mixed

8353.....NI5F
8354.....DC8TS
8355 .....VE7XT
8356 .....N3MVF
8357 .....WA6ST
8358.....K9RJ

All CW

456.....SM6FUD
457 .....RUØLL

RTTY

157 .....JA1WPX

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

CQ DX Awards Program

SSB

2453.....KP4FJT
2454 .....WR2R
2455.....W3LL
2456.....N4ABC

CW

1066 ..... 4Z5SG

SSB Endorsements

320 .....W8AXI/334
320 .....KE3A/333
320 .....WD9DZV/278
200 .....W3LL/246
28 MHz W3LL
3.5/7 MHz W3LL

CW Endorsements

320 .....K4JLD/328
320 .....KE3A/323
320 .....W3II/321
310 .....W6YQ/314
310 .....W6YQ/314
275 .....WD9DZV/277
200 .....K6UXO/237
3.5/7 MHz.....4Z5SG

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

is *much* more likely to get the QSO, but the frequency will no doubt stay clear for just 1–2 QSOs. Starting to transmit my call, I suddenly realized that the power was set for QRP, at 10 watts. Not much chance of getting through at that level! I swung the PWR knob as the callsign was being sent. He came back first time! The "G" of my callsign was at 10 watts, the "W" probably at about 40 watts. The operator at the time (MØDXR) really has great ears! My antenna is an inverted-V at 30 feet.—*Roger, G3SXW*

It's interesting (at least to me) that both of these short stories are about DXing on CW . . . but then again, I'm a CW guy. In spite of what's happened to the requirement for CW around the world, there are still a lot of us who enjoy that mode and will until our dying day. Did you note Roger's comment about the "QRP" when he started calling? I haven't gotten around to that yet, but I hear more and more stories about those who are avid QRPers, and many of them have DXCC totals that would make many QRO folks sit up and take notice.

On the Air . . . from Inside a Volcano!

Recently, I had an interesting QSO with Rick, NE8Z/HC1MD, in Ecuador. He goes there quite often to visit his wife's family. This time Rick made a number of side trips. One of them was to a volcano. Here is part of an e-mail I received from him following our contact:

I was operating as HC1MD/HD7 from Papallacta Volcano in Napo Province, Ecuadorean Amazon. This was the first time I had ever operated from *down inside* the volcano cone. Hence my weak signals! hi hi.

Carl, I only made eight QSOs in 4 hours and you were number one at 2335Z on 10105 kHz. Yes, that was me you called. I then worked K2ZR/4 at 2341Z, N4RI at 0205Z, W4IHI at 0207Z, K4CV at 0215Z, YN4SU at 0209Z, KK8I at 0223Z (tnx 229 report! hi . . . Now you know why. . . .I was using vertical propagation!), K5LH at 0454Z . . . all on 30 meters.

You can see my site by going to <www.termasdepapallacta.com>. I was using the FT-857 to the Outbacker . . . first clamped to a tin roof under the thatched roof . . . then I moved it to a ground rod. What was interesting was the echo on the signals. I spent at least 3 hours listening to the different bands. All signals seemed to bounce into the cone. . . . It was probably the most interesting sound that I ever heard on the bands.

—*Rick, HC1MD/HD7*

Now I doubt that many of us will ever have the opportunity to operate from "inside" a volcano, but obviously it was a learning experience for Rick. Did you notice once again that this operation was on CW? That mode just will not go away, will it? I certainly hope not. It will get through when others cannot. Long live CW!

DX News

The VU4RBI QSL cards continue to show up in DXers' mailboxes. Many of those were "hand delivered" by Bharathi herself at the Visalia International DX convention and at a Lone Star DX Association meeting in Dallas, Texas. I suspect more will have been provided at the Dayton Hamvention® (although I had not been told this as of the writing of this column, a week before Dayton). Many thanks to Bharathi and India's National Institute of Amateur Radio (NIAR) for making the cards available.

The cards for the FT5XO operation started showing up in early May. Thanks to the team and its QSL Manager for getting these cards out so quickly after the operation ended.

This vintage FB8ZZ QSL card confirms a contact on March 3, 1957 with WØYFT. WØYFT was my original call as a teenager in Kansas City. F6AJA recently sent out an inquiry looking for any information on several FB calls and I was pleased to offer him a copy of this card. (Photo courtesy of Carl, N4AA [ex-WØYFT])

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 335 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 334	N4JF 334	K4IQJ 333	N4AH 332	4N7ZZ 330	W4QB 327	N5ZM 323	G3KMQ 317	G3DPX 284
K2FL 334	K4MQG 334	WØHZ 333	HB9DDZ 332	W6DN 330	DL8CM 327	KE3A 323	YT1AT 317	EA3BHK 282
K9BWQ 334	EA2IA 334	N5FG 333	N4CH 332	YU1TR 330	W6OUL 327	KE5PO 322	K8JJC 315	YC2OK 282
K9MM 334	PA5PQ 334	N7RO 333	K6LEB 331	W4UW 330	SM5HV/HK7 327	HA5DA 321	W6YQ 314	DJ1YH 281
W7OM 334	K3UA 334	K4CN 333	VE3XN 331	N6AW 330	IT9TQH 326	IKØTUG 321	CT1YH 313	XE1MD 278
K2JLA 334	DL3DXX 334	W4MPY 333	W1WAI 331	G3KMQ 329	I2EOW 326	VE7DX 320	N1HN 313	WD9DZV 277
N7FU 334	K2ENT 334	PY2YP 333	K2JF 331	KZ4V 329	W7IIT 326	IKØADY 320	UA9SG 310	I3ZSX 276
K2OWE 334	OK1MP 334	W8XD 333	K3JGJ 331	N5HB 329	K6CU 326	WG5G/QRPp 320	EA3ALV 306	
N4MM 334	NC9T 334	KA7T 332	WA8DXA 331	W9IL 329	W4LI 325	N7WO 320	YU7FW 306	
F3TH 334	WB5MTV 333	WØJLC 332	K9IW 331	K1HDO 329	9A2AA 325	W3II 321	LU3DSI 302	
F3AT 334	W7CNL 333	K8LJG 332	WB4UBD 331	K7JS 329	N4OT 325	F5OIU 320	N1KC 302	
DJ2PJ 334	YU1HA 333	YU1AB 332	K7LAY 331	K5UO 329	K1FK 324	KA3S 320	VE7KDU 300	
WA4IUM 334	IT9QDS 333	K5RT 332	W2UE 330	K9OW 328	YV5ANT 324	F6HMJ 319	WG7A 295	
W4OEL 334	G4BWP 333	YU1AB 332	I4LCK 330	K4JLD 328	9A2AJ 323	OZ5UR 319	K4IE 291	
W2FXA 334	K4CEB 333	NØFW 332	VE7CNE 330	K8PV 327	W6SR 323	PY4WS 319	WA4DOU 286	

SSB

K6YRA 335	K5TVC 335	K9BWQ 334	WS9V 334	YV1JV 331	EA1JG 329	PY2DBU 325	K6RO 316	K4IE 300
K2TQC 335	N5FG 335	W4NKI 334	4N7ZZ 333	WA4WTG 331	KE4VU 328	IKØIOL 325	N8SHZ 316	WØROB 296
W6EUF 335	DJ9ZB 335	WB4UBD 334	KE5PO 333	W8KS 331	KF8UN 328	YT1AT 325	WZ3E 314	WA1ECF 295
K2JLA 335	PY4OY 335	W4UNP 334	VE1YX 333	YV5IVB 331	WØULU 328	K7HG 324	IZ6CST 314	KW1DX 295
K4MQG 335	VE3XN 335	W8AXI 334	I4LCK 333	KX5V 331	K1EY 328	K4JDJ 323	W7GAX 312	K7ZM 292
IK1GPG 335	4Z4DX 335	VE2GHZ 334	W2JZK 333	K3JGJ 331	KZ4V 328	W6WI 323	CT1YH 311	OA4EI 292
K5OVC 335	N7RO 335	OE2EGL 334	K8LJG 333	N5ORT 331	XE1D 328	EA3CYM 323	YV5NWG 311	K7ZM 292
NØFW 335	IØZV 335	WA4IUM 334	VE4ACY 333	PT2TF 331	W9IL 328	K6CF 322	LU3HBO 310	K1RB 292
K9MM 335	EA2IA 335	K5RT 334	KØKG 333	CT1AHU 331	K3LC 328	LU7HJM 322	WA5MLT 310	KØOZ 291
W6BCQ 335	IN3DEI 335	W2FXA 334	W4WX 333	EA3JL 331	K4DXA 328	K5NP 322	XE2NLD 310	W9ACE 291
XE1AE 335	EA4DO 335	W6SHY 334	VE2WY 333	K9IW 331	LU5DV 328	WA4ZZ 322	RW9SG 307	I3ZSX 290
W7OM 335	PA5PQ 335	W5RUK 334	WB3DNA 333	K1HDO 331	I1EEW 327	WN9NBT 322	W9IL 306	N2LM 286
KZ2P 335	K9OW 335	K4CN 334	K9PP 333	K5UO 331	SV1ADG 327	WW1N 322	XE1MDX 305	KKØDX 285
IK8CNT 335	W6DPD 335	EA3KB 334	W2CC 333	W6DN 330	DL8CM 327	W6OUL 322	EA5OL 305	VE7HAM 285
VK4LC 335	XE1VIC 335	N4CH 334	DL3DXX 333	YV1CLM 330	F9RM 327	XE1CI 321	WB2AQC 305	N8LIQ 284
OE7SEL 335	K2ENT 335	K3UA 334	EA3BMT 333	AB4IQ 330	XE1MD 327	CT1ESO 321	VE7SMP 305	WØIKD 283
VE3MR 335	OK1MP 335	K4JLD 334	EA3EQT 333	AE5DX 330	IØSGF 327	EA8TE 321	KK4TR 305	K7SAM 283
VE3MRS 335	IZ6GPZ 335	N5ZM 334	YV1KZ 333	KB2MY 330	IT9TGO 327	KD5ZD 321	K3BYV 303	KBØRNC 282
K4MZU 335	K1UO 335	PY2YP 334	KE3A 333	K3PT 330	IT9TQH 327	KØFP 320	YC2OK 303	IK8TMI 281
OZ5EV 335	I8KCI 335	AA4S 334	YV1AJ 332	ZL1BOQ 330	DK5WQ 327	EA7TV 320	JR4NUN 303	F5JSK 281
N7BK 335	I8LEL 335	CT3DL 334	KSØZ 332	N7WR 330	KE5K 327	SV1RK 320	VE7KDU 302	KA5OER 280
K7LAY 335	DU9RG 335	NC9T 334	LU4DXU 332	WS9V 329	CP2DL 327	N1KC 320	W5GZI 302	F5INJ 279
ZL3NS 335	DU1KT 335	W9SS 334	VE4ROY 332	K2JF 329	NI5D 327	W5GZI 320	W4PGC 302	WD9DZV 278
N4MM 335	N4JF 335	VE7WJ 334	W7FP 332	ZL1AGO 329	K7TCL 326	SV3AQR 320	YV2FEQ 301	W5GT 276
OZ3SK 335	CT1EEB 335	VE2PJ 334	K9HQM 332	W9OKL 329	W9HRQ 326	KD2GC 320	AC6WO 301	4Z5FL/M 275
K7JS 335	WDØBNC 334	W3AZD 334	W2FKF 332	I2EOW 329	DL6KG 326	KE4SCY 319	4X6DK 301	
XE1L 335	K2FL 334	YZ7AA 334	CT1EEN 332	VE7DX 329	HB9DDZ 326	CE1YI 318	SV2CWY 300	
YU1AB 335	WØYDB 334	CT3BM 334	DL9OH 331	W2FGY 329	WR5Y 325	W5OXA 317	4X6DK 300	
OE3WWB 335	W4UW 334	N6AW 334	N2VW 331	CT1CFH 329	KC4MJ 325	YV4VN 317	N5WYR 300	

RTTY

K2ENT 333	K3UA 328	EA5FKI 320	W2JGR 316	OK1MP 312	KE5PO 297	W4EEU 297	I2EOW 291	YC2OK 280
WB4UBD 330	NI4H 325	N5FG 318	G4BWP 312	PA5PQ 311				

The annual ARRL Field Day activity is coming up the end of June. A lot of contesters/DXers enjoy this event. It's a great activity to show newcomers to contesting what it's all about. With a bit of effort, most clubs generate some media coverage for their activity. In addition, the news coverage ham radio received following the December tsunami definitely helps our image in the eye of the public. Ham radio has been recognized as a major player by the U.S. Homeland Security folks, too. Utilize these things as you talk to the news media about your plans for Field Day. Invite the public to come and observe ham radio in action, and be sure to have a media-savvy person available to talk to the media and visitors.

Oh yes . . . remember the IARU HF Championship coming up in July.

Until next time, enjoy the chase and above all, *have fun!* 73, Carl, N4AA

QSL Information

G3HCT via VK4OQ
G3OLU via EA5ARC
GBØSK via GØRCI
GD6IA via GD3UMW
GM5CEV via WB5ZAM
GM7CXM/C6A via EA5ON
H36V via HP2AT
HGØ5MDC via IT9DAA
IBØCW via IK8RRY
IC8/IK8GDA via IK8GDA
IC8/IK8NTN via IK8NTN
IC8/IN3XUG via IN3XUG
IC8/IZ8CKS via IZ8CKS
IG9R via IK8HCG
IIØESA via IZØFEJ
IIØSRM via IZØBTV
II1SRM via IZ1EGT
II4ANT via IK4QIB
II7SRM via IZ7AUH
II8MDC via IT9DAA
II8SRM via IZ8EDJ
II9MDC via IT9DAA
IO8MDC via IT9DAA
IO8SRM via IK8WEJ
IQ8MD via IZ8BGY
IR1ANT via I1JQJ
IR2MDC via IT9DAA
IR5MDC via IT9DAA
IR8DX/P via IK8VRH
IR8M via IT9DAA
IR9MDC via IT9DAA
IU1MDC via IT9DAA
IU1R via IK1PMR
J2ØFH via F5PRU
J41PHG via SV1DPP
J41V via SV1CQN
J79DL via N1DL
JS6PXB/6 via JS6PXB
JT2Y via IØSNY
JU1DX via JT1BV
JW/UA3AB via UA3AB
JW1ANA via LA1KHA.
KØNR/C6A via KØNR
K7C via N4XP
KH8SI via VE3HO
KO1H /VP9 via KO1H
KO1H/VP9 via KO1H
KP4SQ via W3HNK
KP4WW via W3HNK
L73E via LU7EE
LZØ5KM via LZ1PJ
LZ8ØØAB via LZ1PJ
LZ9A via LZ2HM
M2Z via M5AAV
M5RIC via M5AAV
M8Y via MØARK
MD5RIC via M5AAV
MJ/DL1WA via DL1WA
MJØRHF via OE1ZKC
MJ2Z via M5AAV
MJ5RIC via M5AAV
MMØDFV/m via MMØDFV
MMØVSG/P via GM7WED
MU2Z via M5AAV
MU5RIC via M5AAV
MW2Z via M5AAV
MW5RIC via M5AAV
N1DL/HI7 via N1DL
N1DL/J6 via N1DL
N1HRA/VP9 via N1HRA
N2G via JHØMGJ
NK4AA via N2NL

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

Resources for Those On the Go

BY TOMAS HOOD,* NW7US

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, April 2005: 24
Twelve-month smoothed, October 2004: 36

10.7 cm Flux
Observed Monthly, April 2005: 86
Twelve-month smoothed, October 2004: 102

***Ap* Index**
Observed Monthly, April 2005: 20
Twelve-month smoothed, October 2004: 14

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2005

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 7-8, 12, 14, 17-19, 23, 25-27	A	A	B	C
High Normal: 1, 3-4, 6, 9-10, 13, 15-16, 20, 24, 28, 30-31	A	B	C	C-D
Low Normal: 5	B	C-B	C-D	D-E
Below Normal: 11, 21-22	C	C-D	D-E	E
Disturbed: 2, 29	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be good (B) on July 1st, poor (D) on the 2nd, good (B) on the 3rd and 4th, etc.**

This month I'd like to share with you some samples from my WML/WAP version of the Propagation and Ham Radio Resource Center <http://hfradio.org>. When you cause your web-enabled cell phone or other web-enabled hand-held device to browse the special version at <http://wap.hfradio.org>, you will be presented with the main menu screen (fig. 1). As you can see, you have the option to check current space weather and other data that influence the propagation of our hobby signals. In addition, you can look up amateur radio operator callsigns, or keep up-to-the-minute with DX spots (see fig. 9, near the end of this column).

If you follow the Propagation menu link option, you will get a new menu dealing with space weather, solar images, and related information (fig. 2). You can then select a textual report (fig. 3) that tells you the latest *K*- and *A*-index readings, the latest solar flux level and sunspot count, and more.

For those phones and devices that can handle color graphics, solar images and graphs of space weather and terrestrial data are provided. Fig. 4 shows one of the LASCO images, while fig. 5 is the display of the solar disk, allowing you to see the current sunspots for yourself. Fig. 6 is a sample of the EIT display, useful for spotting a coronal hole.

The graphs provided include the running *Kp* readings for the last couple of days (fig. 7) or other important readings (fig. 8).

Using these resources and tools, a truly mobile or portable station can stay informed about space weather and geomagnetic conditions. Armed with this wealth of data, a serious communicator can plan better when and where to work the bands. Also, if you need to find out the location of a DX prefix or identify a station by finding the callsign information, or even want to see what sort of activity is being reported on the DX clusters, my WAP/WML Amateur Radio Resource is handy.

July Propagation

Many DX hunters view July as the least exciting month of the year. With generally lower summer-time MUFs (maximum usable frequencies), the highest of the amateur HF bands are mostly unusable for long-distance *F*-layer propagation. Added to this seasonal change is the lower solar activity of the ever-declining sunspot cycle. We are only a year or two away from the solar minimum (expected at the end of 2006 or at the beginning of 2007). Solar activity is significantly less than it was just a year ago.

Fig. 1– The WML/WAP version of The Propagation and Ham Radio Resource Center at <http://wap.hfradio.org>. When you cause your web-enabled cell phone or other web-enabled hand-held device to browse this version, you will be presented with the main menu screen, shown here. Additional sample screens are shown throughout this month's column.

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

Fig. 2– Follow the Propagation menu link option at <http://wap.hfradio.org>, you will get a new menu dealing with space weather, solar images, and related information.

Fig. 3– After you access the menu shown in fig. 2, you can then select a textual report that tells you the latest K- and A-index readings, the latest solar flux level and sunspot count, and more.

Fig. 4– For those phones and devices that can handle color graphics, solar images and graphs of space weather and terrestrial data are provided. Shown here is one of the LASCO images.

While *F*-layer propagation of the highest HF frequencies will be poor, radio signals near the BUF (best usable frequency) will be stable over paths that could remain open for longer periods than during the winter and early spring seasons. In addition, July's sporadic-*E* ionization is near the year's seasonal peak. This should result in a considerable increase in short-skip openings on almost all of the HF amateur bands and on 6 and 2 meters as well.

Twenty meters should continue to be the best band for DX propagation during July. When conditions are at least Low Normal, the band is expected to remain open to one area of the world or another from sunrise through the early evening. (Don't be surprised if we see a couple of days with a 10.7-cm flux reading above 120. Although rare, we're still seeing an occasional sunspot group or two that are active and large enough to bring a small breath of life into the higher frequencies.) Peak conditions on 20 meters are expected for a few hours after local sunrise and again during the late afternoon and early evening, when the band should open in almost all directions. When conditions are at least Low Normal, expect 20-meter openings toward South America, the South Pacific, and Oceania until as late as midnight. When conditions are High Normal or better, the band should also remain open to most other areas of the world until as late as midnight.

Considerably fewer *F*-layer-path 15-meter DX openings and very few, if any, 10-meter openings are expected during July than were experienced in previous years. This is due to a combination of changing seasonal conditions and the current level of solar activity in the decline of this solar cycle. When conditions are at least Low Normal, 15 meters should open occasionally toward the south. Look for some short-skip openings into the Caribbean area and Central America as early as 10 AM, with a peak expected to all areas of Latin America between 3 and 5 PM local daylight time. When conditions are High Normal or better, the band may also open to Africa during the late afternoon from the eastern half of the country, and to Australasia and the South Pacific area during the late afternoon and early evening from the western half of the country. Seventeen meters will act somewhat the same as 15, but openings will be tend to be longer and signals perhaps stronger and more stable.

Expect short-skip openings on 10 and 12 meters during July toward the Caribbean and possibly Central America as a result of sporadic-*E* ionization. When conditions are High Normal or better, an occasional opening deeper into South America may be possible, especially during the afternoon hours.

Overall look for frequent short-skip openings on 10, 12, 15, and 17 meters between distances of 500 and 1300 miles. During the afternoon hours skip may extend to beyond 2300 miles as a result of *F*-layer reflection. Short-skip openings should range between 250 and 2300 miles on 20 meters. Peak conditions are most likely to occur during the late morning and again during the late afternoon and early evening hours. Daytime openings on 40 and 30 meters should range between 100 and 600 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the maximum short-skip (one-hop *F*-layer reflection) of 2300 miles during the hours of darkness.

Nighttime openings into many areas of the world are possible on 20, 30, and 40 meters. However, seasonally high static levels may often make DX reception difficult on both 30 and 40 meters.

Fig. 5– A display of the solar disk, which allows you to see the current sunspots.

Fig. 6– A sample of the EIT display, useful for spotting a coronal hole.

Fig. 7– The graphs provided include the running Kp *readings for a couple of days.*

High static levels are also expected to result in somewhat poorer DX conditions on 80 meters, although some long-distance openings are forecast for the hours of darkness. 160 meters is virtually shut down due to the high static levels of summer. The best bet for 40-, 80-, and 160-meter DX openings is an hour or two before midnight for openings toward the north and east, and just before local sunrise for openings toward the south and west. Expect some 160-meter openings between sunset and sunrise for distances up to approximately 1300 miles, if the seasonally high static levels permit.

Peak Sporadic-*E* Propagation

Optimum short-skip propagation conditions are expected during July as a result of a seasonal peak in sporadic-*E* ionization. Expect an increase in the number of short-skip openings on HF, and often on 6 and 2 meters. During the daylight hours, considerable short-skip openings are forecast for 10 and 15 meters over distances ranging between approximately 400 and 1300 miles, with openings occasionally extending out to beyond 2000 miles. Around-the-clock short-skip openings should be possible on most days on 20 meters, with the skip often as short as 300 miles and as long as 2300 miles. Short-skip conditions on 20 meters should peak during the late afternoon and the early evening.

Good daytime openings on 40 and 30 meters should range between 100 and 750 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the one-hop limit of 2300 miles during the hours of darkness. However, these bands could be quite noisy.

While no short-skip openings are likely on 160 meters during the daylight hours of July, expect some openings between sunset and sunrise for distances up to approximately 1300 miles, if the static levels are low.

VHF Conditions

Statistical studies show that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances ranging between approximately 600 and 1300 miles should be possible on 6 meters. Openings may also be possible on 2 meters during periods of intense sporadic-*E* ionization, with stations up to 1300 miles away. While sporadic-*E* short-skip openings can take place at just about any time of the day or night, statistics indicate that conditions should peak for a few hours before noon and again during the late afternoon and early evening. During July you can expect 6-meter sporadic-*E* on at least three out of every four days. Openings may last from a few minutes up to hours.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for April 2005 is 24.4, with the lowest daily sunspot value recorded on April 24 with a reading of 9. The highest daily sunspot count was 37 on April 30. The 12-month running smoothed sunspot number centered on October is 35.9, down from September's 37.6. A smoothed sunspot count of 17, give or take about 12 points, is expected for July 2005 (you can see that the worst case translates to about 5 as a possible monthly sunspot count; this is possible, though unlikely).

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 85.9 for April 2005, down a bit from March's 90. The 12-month smoothed 10.7-cm flux centered on October 2004 is 102.1, down from September's 103.7. The predicted smoothed 10.7-cm solar flux for July 2005 is 79, give or take about 16 points.

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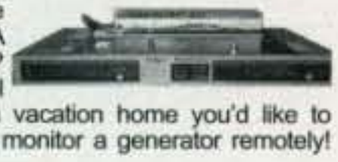

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Fig. 8– Other important readings are also included as graphs at this site.

Fig. 9– At <http://wap.hfradio.org> you can also look up amateur radio operator callsigns or keep up-to-the-minute with DX spots.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates possible 10 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last-Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *daylight* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 PM in Los Angeles; 18 or 6 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
July & August 2005
Local Daylight Savings Time
At Path Mid-Point

Band (Meters)	*Distance Between Stations (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	08-10 (0-1)	08-10 (1)	08-10 (1-0)
		10-14 (0-3)	10-14 (3)	10-14 (3-0)
		14-18 (0-1)	14-18 (1-2)	14-18 (2-0)
		18-22 (0-2)	18-22 (2-3)	18-22 (3-0)
		22-08 (0-1)	22-08 (1)	22-08 (1-0)
15	*Nil*	08-10 (0-2)	08-10 (2)	08-10 (2-0)
		10-14 (0-3)	10-14 (3)	10-14 (3-0)
		14-18 (0-2)	14-18 (2)	14-16 (2-0)
		18-20 (0-3)	18-20 (3)	16-18 (2-1)
		20-22 (0-2)	20-22 (2)	18-20 (3-1)
		22-08 (0-1)	22-00 (1-2)	20-21 (2-1)
			00-08 (1)	21-00 (2-0)
				00-08 (1-0)
20	10-00 (0-1)	07-10 (0-2)	07-10 (2)	07-10 (2)
		10-16 (1-4)	10-16 (4)	10-16 (4-2)
		16-21 (1-3)	16-19 (3)	16-19 (3)
		21-00 (1-2)	19-21 (3-4)	19-21 (4)
		00-07 (0-1)	21-00 (2-3)	21-23 (3-2)
			00-07 (1-2)	23-00 (3-1)
				00-05 (2-0)
				05-07 (2-1)

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40	08-12 (1-2)	08-10 (2-3)	08-10 (3-1)	08-10 (1-0)
	12-16 (1-4)	10-12 (2)	10-16 (2-0)	10-16 (0)
	16-20 (2-4)	12-16 (4-2)	16-18 (3-1)	16-18 (1-0)
	20-23 (1-2)	16-18 (4-3)	18-21 (4-3)	18-21 (3-2)
	23-08 (0-1)	18-20 (4)	21-23 (4)	21-06 (4)
		20-23 (2-4)	23-06 (3-4)	06-08 (3-1)
		23-08 (1-3)	06-08 (3)	
80	07-12 (3-4)	08-10 (4-1)	08-10 (1-0)	08-19 (0)
	12-17 (4-3)	10-12 (4-0)	10-17 (0)	19-21 (1-0)
	17-22 (4)	12-17 (3-0)	17-19 (0-1)	21-23 (2-1)
	22-05 (3-4)	17-19 (4-1)	19-21 (2-1)	23-04 (4-3)
	05-07 (3)	19-21 (4-2)	21-23 (3-2)	04-05 (4-2)
		21-23 (4-3)	23-05 (4)	05-06 (3-1)
		23-05 (4)	05-07 (3)	06-07 (3-0)
		05-07 (3)	07-08 (2-1)	07-08 (1-0)
		07-08 (4-2)		
160	18-19 (1-0)	19-20 (1-0)	21-22 (1)	21-23 (1-0)
	19-20 (1)	20-21 (2-0)	22-01 (2-1)	23-01 (1)
	20-22 (3-2)	21-22 (2-1)	01-04 (2)	01-06 (2-1)
	22-00 (4-3)	22-00 (3-2)	04-06 (3-2)	06-07 (1-0)
	00-06 (4)	00-04 (4-2)	06-07 (1)	
	06-08 (3-2)	04-06 (4-3)	07-08 (1-0)	
	08-09 (1)	06-08 (2-1)		
	09-10 (1-0)	08-09 (0-1)		

HAWAII
Openings Given in Hawaiian Standard Time

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	12-14 (1)	02-05 (1)	18-20 (1)	20-21 (1)
	14-15 (2)	05-07 (2)	20-00 (2)	21-23 (2)
	15-16 (1)	07-14 (1)	00-02 (1)	23-01 (1)
		14-16 (2)		
		16-18 (3)		
		18-19 (2)		
		19-20 (1)		
Central USA	09-13 (1)	04-05 (1)	18-21 (1)	20-22 (1)
	13-17 (2)	05-07 (3)	21-22 (2)	22-01 (2)
	17-19 (1)	07-09 (2)	22-01 (3)	01-02 (1)
		09-13 (1)	01-02 (2)	21-02 (1)*
		13-16 (2)	02-03 (1)	
		16-18 (4)		
		18-19 (3)		
		19-20 (2)		
		20-22 (1)		
Western USA	08-09 (1)	04-06 (1)	18-19 (1)	19-20 (1)
	09-11 (2)	06-08 (2)	19-20 (2)	20-22 (2)
	11-13 (1)	08-11 (3)	20-22 (3)	22-02 (3)
	13-15 (2)	11-15 (2)	22-02 (4)	02-03 (2)
	15-17 (3)	15-16 (3)	02-04 (3)	03-04 (1)
	17-18 (2)	16-18 (4)	04-05 (2)	23-03 (1)*
	18-19 (2)	18-19 (3)	05-06 (1)	
	14-16 (1)**	19-21 (2)		
		21-23 (1)		

ALASKA
Openings Given in GMT

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	*Nil*	12-15 (1)	07-10 (1)	*Nil*
		22-01 (1)		
		01-03 (2)		
		03-05 (1)		
Central USA	00-03 (1)	13-16 (1)	08-12 (1)	*Nil*
		23-01 (1)		
		01-04 (2)		
		04-05 (1)		
Western USA	02-05 (1)	14-16 (1)	07-09 (1)	10-13 (1)
		16-18 (2)	09-13 (2)	
		18-00 (1)	13-15 (1)	
		00-02 (2)		
		02-05 (3)		
		05-06 (2)		
		06-08 (1)		

*Indicates best time to listen for 160 meter openings.
**Indicates best time for 10 meter openings.
For 12 m openings interpolate between 10 and 15 m openings.
For 17 m openings interpolate between 15 and 20 m openings.
For 30 m openings interpolate between 40 and 20 m openings.
Note: The Alaska and Hawaii Porpagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

Propagation charts prepared by George Jacobs, W3ASK.

tary *A*-index (*Ap*) for April 2005 is 12, the same as the March index. The 12-month smoothed *Ap*-index centered on October 2004 is 13.5, about the same as for both August and July (13.8). Expect the overall geomagnetic activity to be quiet to active during most days in July, with some isolated periods of stormy activity. Refer to the Last-Minute Forecast for the outlook on what days this might occur.

In Closing . . .

Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. You can get live, up-to-the-minute solar weather and terrestrial data by visiting my Space Weather and Radio Propagation center at <http://prop.hfradio.org>, so come take a look. As discussed at the beginning of this column, these resources may also be viewed on a cell phone or other wireless device that has WAP/WML features by browsing to <http://wap.hfradio.org>.

Drop me an e-mail or send me a letter if you have questions or topics you would like to see me explore in this column. I'd also love to hear any feedback you might have on what I have written. Until next month . . .

73, de Tomas, NW7US/AAAØWA

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ZC4LI	**1,595**	**5,815**	**502**	**2,919,130**
ZF2NT	**1,740**	**5,285**	**540**	**2,853,900**
UW5Q	**1,517**	**5,221**	**532**	**2,777,572**
RD3A	**1,432**	**4,682**	**592**	**2,771,744**
EA1AKS	**1,536**	**5,000**	**554**	**2,770,000**
UW8M	1,774	4,888	561	2,742,168
UA1AKC	1,425	4,801	560	2,688,560
UT2UZ	1,418	4,807	551	2,648,657
JH4UYB	**1,331**	**4,852**	**527**	**2,557,004**
K4GMH	**1,501**	**4,712**	**528**	**2,487,936**
KU1CW	**1,624**	**4,178**	**587**	**2,452,486**
SQ5RK/2	**1,355**	**4,497**	**533**	**2,396,901**
VE1OP	**1,414**	**4,335**	**550**	**2,384,250**
OH2BP	**1,337**	**4,468**	**530**	**2,368,040**
VA3DX	**1,273**	**4,613**	**488**	**2,251,144**
UA9MA	**1,349**	**4,563**	**482**	**2,199,366**
WA2ETU	**1,388**	**3,893**	**524**	**2,039,932**
DL1IAO	**1,111**	**4,457**	**452**	**2,014,564**
DKØEE	1,237	3,986	503	2,004,958
WB9Z	**1,394**	**3,626**	**546**	**1,979,796**
OH7UE	1,281	3,839	511	1,961,729
AI9T	1,418	3,543	545	1,930,935
W4GKM	**1,535**	**3,811**	**506**	**1,928,366**
UT1IA	1,283	3,834	498	1,909,332
IC8POF	**1,187**	**3,748**	**488**	**1,829,024**
IV3IPS	1,080	3,859	469	1,809,871
RA3TT	1,201	3,850	468	1,801,800
DL4RCK	1,252	3,838	469	1,800,022
UY5ZZ	1,196	3,897	460	1,792,620
LTØH	**1,188**	**3,743**	**473**	**1,770,439**
KI5XP	**1,537**	**3,741**	**473**	**1,769,493**
KZ5AM	1,573	3,304	532	1,757,728
ED3RH	1,209	3,581	472	1,690,232
RV3FF	1,183	3,441	483	1,662,003
RN4LP	1,176	3,446	480	1,654,080
RV6YZ/6	1,156	3,616	455	1,645,280
YT5A	**1,045**	**3,606**	**454**	**1,637,124**
JF1PJK	**1,053**	**3,459**	**463**	**1,601,517**
UT2II	814	3,656	423	1,546,488
S51DX	**761**	**3,704**	**410**	**1,518,640**
DM5TI	1,129	3,323	457	1,518,611
3Z9U	1,055	3,266	462	1,508,892
RXØAT	1,067	3,310	448	1,482,880
7S2E	**1,032**	**3,357**	**436**	**1,463,652**
W2YC	1,043	3,172	461	1,462,292
RA4UVK	1,116	3,049	462	1,408,638
AD4EB	1,245	2,996	461	1,381,156
VO1HP	**1,029**	**2,866**	**479**	**1,372,814**
WK6I	**1,331**	**3,011**	**452**	**1,360,972**
JM1XCW	917	3,247	400	1,298,800
ZL2AMI	**852**	**3,158**	**400**	**1,263,200**
RA9MJ	928	3,040	403	1,225,120
UAØCA	932	2,907	412	1,197,684
JA7IC	**877**	**2,745**	**428**	**1,175,288**
NO2T	996	2,657	442	1,174,394
KØFX	1,067	2,626	425	1,116,050
K3GP	**937**	**2,426**	**456**	**1,106,256**
ON6LEO	**831**	**2,731**	**399**	**1,089,669**
KP4JRS	**870**	**2,769**	**393**	**1,088,217**
W2YE	940	2,489	415	1,032,935
N2BJ	945	2,345	434	1,017,730
RW3LB	871	2,576	391	1,007,216
N8KM	**923**	**2,481**	**383**	**950,223**
UN6G	**815**	**2,796**	**334**	**933,864**
SP3HUU	762	2,346	398	933,708
W4UK	1,105	2,348	389	913,372
W1AJT/VE3	**861**	**2,222**	**406**	**902,132**
KH6GMP	**874**	**2,885**	**308**	**888,580**
UA3LEO	749	2,294	381	874,014
K7WM	856	2,116	411	869,676
9M2CNC	**861**	**2,363**	**364**	**860,132**
F8BNN	**701**	**2,351**	**365**	**858,115**
K7AGE	978	2,085	405	844,425
W1RY	770	1,996	394	786,424
RV9XM	723	2,388	325	776,100
AN4BT	761	2,010	378	759,780
OK2PZ	**660**	**2,232**	**337**	**752,184**
YL2CI	**697**	**2,220**	**337**	**748,140**
RD4WA	761	2,235	327	730,845
N4ZZ	875	1,895	377	714,415
OK2SFP	695	2,236	318	711,048
SM7BHM	626	2,039	345	703,455
RZ3DX	702	2,000	345	690,000
OE5ØIGP	**538**	**2,095**	**313**	**655,735**
RV6BC	705	1,999	328	655,672
SA5D	595	1,789	350	626,150
AN5YJ	709	1,732	361	625,252
WW4KY	702	1,708	365	623,420
VR2BG	**769**	**2,100**	**292**	**613,200**
YB5QZ	**626**	**1,901**	**320**	**608,320**
RW4WZ	645	1,746	339	591,894
EA3NM	596	1,745	337	588,065
KE6RAD	805	1,878	308	578,424
IZ4DZD	567	1,780	321	571,380
YL2PA	512	1,721	328	564,488
VE5CPU	**865**	**2,248**	**250**	**562,000**
OH7KNM	590	1,601	350	560,350
N7MQ	804	1,623	339	550,197
WØHW	744	1,639	334	547,426
VE2RYY	**546**	**1,753**	**309**	**541,677**
K9DJ	702	1,507	358	539,506
VE7CF	**751**	**1,871**	**285**	**533,235**
G3YJQ	**609**	**1,613**	**321**	**517,773**
JR3NZC	**558**	**1,831**	**279**	**510,849**
IQ1SM	549	1,733	285	493,905
K5DU	767	1,469	334	490,646
IK2GWH	506	1,612	293	472,316
JA2FSM	**563**	**1,753**	**264**	**462,792**
W2WB	543	1,532	302	462,664
JS1OYN	602	1,656	276	457,056
YL3FP	502	1,797	250	449,250
OH9RI	498	1,555	286	444,730
HB9CAL	**502**	**1,513**	**291**	**440,283**
K5ZD/1	480	1,518	290	440,220
SQ7B	497	1,523	286	435,578
AB0RX	762	1,615	260	419,900
WW7OR	553	1,548	268	414,864
YBØAJR	498	1,673	247	413,231
NC7J	743	1,640	249	408,360
G3OOK	454	1,464	275	402,600
EI4DW	**477**	**1,359**	**296**	**402,264**
W6IHG	506	1,364	293	399,652
EY8MM	**500**	**1,443**	**271**	**391,053**
WR3O	600	1,390	275	382,250
WA6BOB	543	1,629	233	379,557
F5CQ	470	1,345	281	377,945
YL2GC	400	1,325	278	368,350
DL5YM	421	1,307	272	355,504
MW2I	**454**	**1,332**	**265**	**352,980**
JT1CO	**596**	**1,649**	**209**	**344,641**
EA8ANE	**397**	**1,422**	**228**	**324,216**
WA3AAN	493	1,218	256	311,808
VE6YR	504	1,214	251	304,714
AK2P	477	1,075	277	297,775
UA3DPM	404	1,256	236	296,416
RX9TX	420	1,343	220	295,460
N7BF	568	1,137	252	286,524
DK9CG	374	1,228	229	281,212
OK2WH	374	1,189	233	277,037
UABQBR	435	1,089	247	268,983
N2FF	454	1,118	237	264,966
DL2FK	348	1,094	242	264,748
NA2M	530	1,130	234	264,420
UA9KJ	350	1,302	203	264,306
K5SF	615	1,145	230	263,350
N3YEA	439	1,055	245	258,475
RUØLL	416	1,265	202	255,530
DH8WR/HC2	361	1,223	205	250,715
DJ2SL	345	1,087	226	245,662
PJ2/N8BJQ	**409**	**1,219**	**201**	**245,019**
DK7ZT	313	1,155	212	244,860
NW6S	441	955	253	241,615
K7KAR	483	998	241	240,518
DU3NXE	**426**	**1,263**	**187**	**236,181**
OK2SG	289	1,085	207	224,595
EA3AGZ	340	892	249	222,108
K7JJ	468	1,023	216	220,968
ACØM	400	988	221	218,348
SV1DPI	**283**	**898**	**233**	**209,234**
DK1BX	315	892	225	200,700
HL3AHQ	**362**	**1,194**	**168**	**200,592**
KK9T	348	841	234	196,794
N1UZ	400	922	210	193,620
NN6XX	418	876	219	191,844
KO6LU	453	884	216	190,944
DG8LAV	312	819	229	187,551
W7YES	370	850	217	184,450
W6IWO	455	807	226	182,382
UA9YAD	295	1,028	177	181,956
JE1GMM	323	860	208	178,880
OK1DOZ	279	896	196	175,616
NF6V	382	806	213	171,678
W7QF	306	816	204	166,464
YO7BGA	**293**	**814**	**202**	**164,428**
W2YK	315	749	219	164,031
UAØWL	238	941	173	162,793
9A8A	**267**	**878**	**183**	**160,674**
WØTY	369	747	213	159,111
DJ9RR	270	846	187	158,202
WB2JEP	348	814	194	157,916
K3MD	274	758	202	153,116
JR1NHD	324	817	186	151,962
4U1WB	418	732	203	148,596
W5PF	295	758	196	148,568
JR1BAS	271	855	171	146,205
K5HDU	317	730	191	139,430
W1DY/5	460	689	184	126,776
9V1GO	**299**	**854**	**148**	**126,392**
UA4RF	229	708	175	123,900
N5PU	303	683	178	121,574
VE9MY	217	727	164	119,228
DF6DBF	227	714	164	117,096
AE9B	295	565	205	115,825
CM2ZK	**238**	**719**	**157**	**112,883**
KH6FI	222	809	128	103,552
KR7X	317	559	177	98,943
S53XX	229	593	160	94,880
OK2ZW	208	587	160	93,920
NI5F	200	678	136	92,208
DL2JV	200	562	163	91,606
OK2BTJ	219	540	169	91,260
W6AAN	198	656	137	89,872
UAØLMO	225	662	132	87,384
YL2GD	178	614	141	86,574
NK4CC	211	546	156	85,176
JA1BWA	214	711	117	83,187
DL4CF	190	602	138	83,076
AB9H	238	516	156	80,496
OK2BZ	180	617	130	80,210
UR7EM	200	548	145	79,460
DJ4PI	187	548	144	78,912
W3FQE	212	495	156	77,220
KI6CK	229	573	131	75,063
K4MU	231	516	144	74,304
HB9AVK	141	662	111	73,482
DK5WL	159	566	127	71,882
DL1YFF	174	541	130	70,330
G3AB	170	505	138	69,690
KØBX	163	447	135	60,345
W8JGU	164	469	127	59,563
N3NZ	212	409	133	54,397
VK3FM	**145**	**461**	**111**	**51,171**
KA7KUZ	206	345	138	47,610
KB5ZFO	223	345	134	46,230
IK2AHB	150	385	115	44,275
W5JAY	130	397	109	43,273
JA2BQX	142	420	97	40,740
JS3CTQ	142	408	99	40,392
DL1DQJ	121	367	107	39,269
N4XMX	115	429	91	39,039
W6ISQ	123	323	50	38,760
N5DD	120	363	99	35,937
JF2FIU	128	358	100	35,800
EA4ZB	130	314	111	34,854
K6HGF	189	305	114	34,770
RA3FD	113	372	91	33,852
WG7X	171	303	110	33,330
DL7UFN	119	343	96	32,928
JA2QVP	118	376	87	32,712
LZ2PL	**101**	**377**	**84**	**31,668**
JA3BCT	114	336	94	31,584
HB9DWU	108	351	89	31,239
KØAD	151	250	107	26,750
VE7KET	95	281	86	24,166
PAØLOU	**99**	**250**	**89**	**22,250**
JA4EZP	94	288	74	21,312
DL9NEI	79	328	63	20,664
UA3TCJ	88	267	72	19,224
W5KI/2	107	226	83	18,758
IZ1DUI	67	274	62	16,988
DG7RO	73	204	67	13,668
SP9LJD	78	193	64	12,352
JK1AFI	52	205	49	10,045
VE2QIP	51	175	41	7,175
K5ZG	50	88	41	3,608
UA1AKE	34	117	26	3,042
EA7GV	32	96	29	2,784
YL6W	25	64	24	1,536
AM3LF	21	53	19	1,007
JK1LUY	6	14	5	70

SINGLE OPERATOR ALL BAND LOW POWER

ZX2B	**1,726**	**5,637**	**593**	**3,342,741**
CN8KD	**1,322**	**5,087**	**500**	**2,543,500**
OO4ADZ	**1,377**	**4,347**	**545**	**2,369,115**
F6IRF	**1,287**	**4,108**	**524**	**2,152,592**
A45WD	**1,205**	**4,179**	**478**	**1,997,562**
UP6P	**1,198**	**4,295**	**462**	**1,984,290**
AA5AU	**1,609**	**3,581**	**527**	**1,887,187**
LZ2BE	**1,233**	**3,544**	**491**	**1,789,204**
EU1MM	**1,071**	**3,585**	**463**	**1,659,855**
RD3BD	**1,106**	**3,481**	**454**	**1,580,374**
UY8IF	**1,114**	**3,343**	**472**	**1,577,896**
4Z5CP	**1,013**	**3,761**	**404**	**1,519,444**
9A3ZI	**1,047**	**3,390**	**441**	**1,494,990**
4X2Z	945	3,726	392	1,460,592
YU7AM	**1,004**	**3,215**	**452**	**1,453,180**
UA4FCO	1,091	3,205	450	1,442,250
8P2K	**1,175**	**3,180**	**439**	**1,396,020**
LZ9R	1,085	3,079	441	1,357,839
UW5U	1,011	3,139	421	1,321,519
ZX7A	**889**	**3,133**	**419**	**1,312,727**
OK2ZC	**929**	**2,977**	**434**	**1,292,018**
USØKW	927	3,014	427	1,286,978
YL2TW	**973**	**3,063**	**408**	**1,249,704**
UO2M	898	3,286	378	1,242,108
HG4I	**843**	**2,918**	**420**	**1,225,560**
DC3HB	**882**	**2,847**	**422**	**1,201,434**
UA4LC/9	1,062	2,851	421	1,200,271
YV6BTF	**855**	**3,110**	**380**	**1,181,800**
UAØAGI	**895**	**2,939**	**394**	**1,157,966**
OZ9GA	866	2,737	408	1,116,696
SV9FBM	**953**	**3,007**	**369**	**1,109,583**
OK2RU	820	2,826	389	1,099,314
RV3QX	908	2,728	393	1,072,104
UT4EO	860	2,903	366	1,062,498
IT9SGN	**878**	**2,625**	**398**	**1,044,750**
DL6JZ	808	2,577	393	1,012,761
AD6WL	**1,119**	**2,559**	**390**	**998,010**
NC2N	**837**	**2,388**	**417**	**995,796**
UT2IO	877	2,626	369	968,994
VE9DX	**791**	**2,585**	**373**	**964,205**
LZ1UQ	881	2,514	375	942,750
WA1EHK	**791**	**2,154**	**423**	**911,142**
N6OJ	**1,160**	**2,317**	**372**	**861,924**
USØAK	752	2,311	371	857,381
W1BYH	867	2,180	376	819,680
UA3SAQ	750	2,335	351	819,585
YB5BO	722	2,273	359	816,007
EA8/DJ1OJ	**616**	**2,407**	**337**	**811,159**
GØMTN	**781**	**2,349**	**344**	**808,056**
UA4HJ	832	2,384	338	805,792
W1ECT	760	2,119	379	803,101
K2SC	**841**	**2,096**	**382**	**800,672**
YV5AAX	690	2,447	321	785,487
SQ6MS	**596**	**2,147**	**358**	**751,450**
F6FTB	697	2,155	339	730,545
NT2A	769	1,886	386	727,996
RA3QN	749	2,105	335	705,175
DL1DTL	661	1,963	354	694,902
UN7JX	638	2,371	291	689,961
OK2PEF	626	2,260	301	680,260
YL2NN	640	1,985	339	672,915
W4LC	759	1,843	365	672,695
RA9XF	664	2,049	321	657,729
AJ3G	732	1,924	340	654,160
WW3S	**657**	**1,698**	**380**	**645,240**
PS7KC	**651**	**1,929**	**334**	**644,286**
IZ3BJK	**627**	**1,899**	**338**	**641,862**
EA4EJP	**763**	**1,838**	**349**	**641,462**
UT5EPP	650	2,134	294	627,396
DN1JC	634	1,931	324	625,644
VE3DZ	**602**	**1,832**	**335**	**613,720**
RV3ZN	660	1,975	308	608,300

TOP SCORES

Single Op High Power

9Y4W (op: YL2GM) 4,965,240
9A5W 3,701,221
KI1G 3,265,632
ZC4LI 2,919,130
ZF2NT 2,853,900

Single Op Low Power

ZX2B (op: PY2MNL) 3,342,741
CN8KD 2,543,500
OO4ADZ(op: ON4ADZ) .2,369,115
F6IRF 2,152,592
A45WD (op: YO9HP) 1,997,562

Multi-Op Single Transmitter

RL3A 6,537,180
HG1S 5,606,512
UA9AYA 5,547,324
IY4W 5,063,805
OM8A 4,981,119

Multi-Op Two Transmitter

LX8M 7,645,980
YT635A 7,264,414
KH6YY 7,017,472
Z37M 6,522,895
OHØZ 6,415,662

Multi-Op Multi-Transmitter

LY5A 8,881,740
RKØAXX 6,784,894
G6P 6,013,120
KA4RRU 3,911,680
OH2K 1,980,495

Single Op 3.5 MHz

S54E 1,545,740
OL1RY (op: OK1DF) 1,256,976
9A7R 1,052,688
UY6F (op: UXØFF) ... 1,007,084
NB1B 967,840

7.0 MHz

I4IKW 2,577,060
SN7Q 2,044,250
HA7UG 1,529,488
C6AKQ (op: N4BP) .. 1,489,752
T94DO 1,006,500

14 MHz

LY3BH 1,102,524
PY2NY 945,216
OH2LU 749,034
CX4AAJ 719,306
WØETC 715,728

21 MHz

LU7HN 1,589,787
S51FB 1,213,236
IV3HAX 1,072,929
K4EA 1,030,500
OH7MJU 871,815

28 MHz

LU1HF 1,601,860
PY2OMS (op: PY5EG) 594,762
LU5FII 462,080
LW4ESY 381,696
4Z8EE 100,842

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W9HLY	**684**	**1,673**	**362**	**605,626**
URØCB	629	1,906	316	602,296
RA3BB	619	1,762	340	599,080
OH7LND	**551**	**1,900**	**313**	**594,700**
SP3DSC	590	1,816	324	588,384
KU5S	**803**	**1,730**	**340**	**588,200**
UA6ECU	600	2,036	277	563,972
UN8PO	620	1,810	308	557,480
UA9AX	588	2,007	276	553,932
EA9IB	**567**	**1,850**	**298**	**551,300**
WB2RHM	683	1,632	328	535,296
RX3ZX	614	1,722	309	532,098
UA3S8W	560	1,738	297	516,186
W3MEL	665	1,599	321	513,279
VE3ESH	599	1,905	269	512,445
YO8FR	**525**	**1,817**	**282**	**512,394**
T94FC	**540**	**1,705**	**299**	**509,795**
SQ4NR	552	1,741	289	503,149
IZ2GIL	519	1,787	281	502,147
SP9W	535	1,720	290	498,800
NBAT	**701**	**1,519**	**327**	**496,713**
VA1CHP	616	1,736	286	496,496
WØKXZ	784	1,544	318	490,992
AG4ZG	657	1,527	320	488,640
PT7AZ	516	1,654	293	484,622
W2JU	609	1,585	303	480,255
W8UL	655	1,539	312	480,168
VE2FK	**546**	**1,708**	**281**	**479,948**
GUØSUP	**479**	**1,308**	**366**	**478,728**
OZ0F	537	1,821	259	471,639
OH4LRP	466	1,543	302	465,986
WX4TM	597	1,560	298	464,880
JA1OVD	**488**	**1,693**	**274**	**463,882**
I1BAY	501	1,646	276	454,296
HA1ZH	490	1,608	279	448,632
HB9DBK	**480**	**1,548**	**288**	**445,824**
RW3DG	554	1,529	291	444,939
SP1HJK	493	1,542	288	444,096
K3SV	550	1,510	293	442,430
VE3XAT	495	1,608	271	435,768
NP4BM	**535**	**1,576**	**276**	**434,976**
VA7ST	**585**	**1,608**	**265**	**426,120**
SP4CJA	501	1,457	290	422,530
RU3VD	447	1,416	298	421,968
DTØHF	**592**	**1,929**	**218**	**420,522**
RA6XE	524	1,697	246	417,462
UA6XIS	546	1,446	283	409,218
UT8EL	521	1,538	263	404,494
F5POJ	454	1,412	285	402,420
SP6DMI	471	1,503	267	401,301
RX9AOG	440	1,577	253	398,981
KE4KWE	634	1,379	288	397,152
PJ7/ND5S	**453**	**1,710**	**238**	**393,308**
VE3HG	498	1,574	247	388,778
SP9TCC	409	1,405	276	387,780
DGØCG	476	1,432	270	386,640
RU3AT	410	1,482	246	364,572
VA3PL	425	1,270	283	359,410
YD3APJ	495	1,203	298	358,494
VR2XLN	**540**	**1,524**	**234**	**356,616**
EU6PW	429	1,447	246	355,962
WD4GBW	451	1,271	278	353,338
UR8IF	435	1,441	244	351,604
MØAFZ	424	1,352	256	346,112
SP9ERV	368	1,366	249	340,134
RV3DND	446	1,325	256	339,200
UTØSE	426	1,314	256	336,384
G6BOX	447	1,323	253	334,719
JA1BNW	475	1,398	239	334,122
SM7BJW	**421**	**1,247**	**267**	**332,949**
K7CMZ	465	1,303	254	330,962
DD1JN/P	425	1,342	245	328,790
KA1LMR	484	1,234	264	325,776
UA3WHF	398	1,234	264	325,776
KA3PVA	536	1,224	265	324,360
3Z75Z	385	1,211	267	323,337
UA9CR	379	1,371	232	318,072
VE3FH	436	1,363	232	316,216
RN9AU	418	1,521	207	314,847
UV1G	437	1,400	222	310,800
UAØFGZ	439	1,442	213	307,146
N7UVH	606	1,272	241	306,552
EA8/DL3KVR	415	1,239	246	304,794
IKØMIB	387	1,215	250	303,750
VE7FO	475	1,303	233	303,599
RUØSN	441	1,348	225	303,300
UA3DCW	476	1,091	278	303,298
SP5GMM	378	1,225	246	301,350
DL4KW	402	1,210	248	300,080
MWØCRI	**440**	**1,152**	**260**	**299,520**
DL1DWT	394	1,259	235	295,865
UT5UKY	380	1,324	223	295,252
EA2BNU	395	1,146	254	291,084
N9CK	467	1,107	261	288,927
PP7ZZ	306	1,451	199	288,749
IK1SOW	368	1,130	254	287,020
ON5SV	380	1,239	230	284,970
UZ5U	435	1,290	219	282,510
N2KX	383	1,077	262	282,174
YO7LGI	398	1,202	231	277,662
KC5NYO	532	1,094	253	276,782
F4CTJ	397	1,149	240	275,760
WG7Y	590	1,089	252	274,428
PA3BFH	**368**	**1,198**	**229**	**274,342**
IK2RPJ	366	1,159	234	271,206
JA1XRH	434	1,273	213	271,149
4L1BR	**318**	**1,389**	**194**	**269,466**
OZ2JP	367	1,253	215	269,395
K9BJM	437	1,052	252	265,104
OH2MZB	396	1,085	244	264,740
RX3DAC	395	1,249	210	262,290
AC6JT	642	1,155	226	261,030
RW6AH	411	1,213	213	258,369
SP8FHJ	354	1,131	228	257,868
OK2PCL	379	1,129	227	256,283
4K6DI	**301**	**1,260**	**203**	**255,780**
RAØSF	456	1,189	213	253,257
OK2BMC	345	1,125	224	252,000
UX8ZA	372	1,172	214	250,808
RW1QN	399	1,043	238	248,234
DK7OM	337	1,094	226	247,244
EW1CQ	311	1,109	221	245,089
RA3TYL	378	1,027	238	244,426
KI8U	431	1,055	231	243,705
US5EEK	368	1,015	240	243,600
HB9DHG	346	1,109	217	240,653
N5IJE	523	1,056	227	239,712
W3OA	408	1,024	234	239,616
DL5ARM	353	1,151	208	239,408
SP4KEV	344	1,144	209	239,096
IZ7EDQ	359	1,059	225	238,275
RA3PW	360	1,084	218	236,312
K4BX	470	1,009	221	222,989
OK2FB	323	1,006	221	222,326
JA1BHK	400	1,100	202	222,200
JG1GGU	381	1,048	209	219,032
PV8DX	332	1,249	175	218,575
DJ6TK	332	933	232	216,456
UA2FCT	**321**	**1,156**	**187**	**216,172**
DL2IAN	315	971	222	215,562
RWØLZ	395	1,055	204	215,220
UT7EJ	316	1,132	186	210,552
DK3RA	297	1,044	201	209,844
NTØF	396	883	235	207,505
WI8W	404	878	232	203,696
SP9LKS	314	1,001	203	203,203
SM6NET	337	895	226	202,270
KØCIE	504	989	203	200,767
DL6UHD	303	1,023	196	200,508
KC4SAW	388	917	218	199,906
YC3MM	**305**	**967**	**205**	**198,235**
SP9FT	327	951	208	197,808
EC4AES	331	855	231	197,505
RX9DJ	314	1,133	172	194,876
EA4CRP	291	1,004	194	194,776
DK6CQ	306	940	203	190,820
YB2EMK	325	984	193	189,912
N1UZ	396	907	208	188,656
OZ7XE	308	926	203	187,978
RW3AI	305	908	206	187,048
N7DB	414	921	203	186,963
SP7FBQ	302	940	198	186,120
DL6FCB	270	904	205	185,320
UT5JAB	298	1,005	184	184,920
G4DBX	297	923	199	183,677
WB5KSD	386	914	200	182,800
RX3PN	296	870	210	182,700
WM5DX	461	811	225	182,475
YBØDPO	296	995	183	182,085
RV3LQ	341	896	202	180,992
LA5TFA	**413**	**865**	**209**	**180,785**
N1NQX	364	871	206	179,426
F4EIZ/P	283	880	203	178,640
MØCOP	299	903	195	176,085
US6IOT	287	861	204	175,644
MWØCPZ	300	984	178	175,152
KF2XF	342	744	233	173,352
SP6BEN	262	865	199	172,135
YO5CRQ	260	887	194	172,078
ON7CFZ	305	869	197	171,193
UN2E	250	1,037	164	170,068
WØSM	480	773	219	169,287
N6QQ	421	766	219	167,754
7N2UQC	**340**	**876**	**191**	**167,316**
OK2CLW	260	883	189	166,887
SP3JIA	274	900	185	166,500
N2LK	367	878	188	165,064
WRØDK	449	767	215	164,905
K0CF	361	809	202	163,418
VE3BDN	291	775	209	161,975
UAØFAI	327	885	181	160,185
SP3HC	274	845	189	159,705
DL8UFO	265	819	195	159,705
UA9ADW	255	1,032	154	158,928
JA7LMZ	**300**	**853**	**186**	**158,658**
OM4TC	**258**	**888**	**178**	**158,064**
W3OFD	336	810	194	157,140
KR1ST	371	854	184	157,136
LA1YE	274	798	196	156,408
SP9RTI	274	841	185	155,585
UA9OV	289	894	174	155,556
4Z5PM	202	1,076	143	153,868
IK2YSJ	278	827	185	152,995
UA3QUO	270	838	182	152,516
K4DJG	351	801	189	151,389
UA9FGJ	250	951	159	151,209
PA3CDN	302	830	181	150,230
DG1RKP	266	843	176	148,368
F5RD	267	852	174	148,248
KJ7NO	382	818	179	146,422
DL3SCN	249	823	177	145,671
KB1HDO	332	662	220	145,640
HB9OTM	293	718	200	143,600
EA7US	257	779	183	142,557
DGØDG	236	789	178	140,442
PA3DBS	292	695	201	139,695
DH2PL	244	796	174	138,504
W7QDM	340	678	201	136,278
OM7RC	257	811	167	135,437
OE1KTS	**244**	**759**	**176**	**133,584**
IK4QIB	245	733	182	133,406
NG1I	344	782	170	132,940
UAØFHT	332	987	134	132,258
WA4OSD	334	750	176	132,000
SP2HXY	246	823	160	131,680
SQ9FMU	220	822	160	131,520
OK2SPD	239	758	173	131,134
OK2ZJ	250	765	171	130,815
W2DXE	271	698	187	130,526
JA8EIU	**288**	**838**	**155**	**129,890**
ON4QX	239	792	164	129,888
WB2DZH	282	652	199	129,748
PA3EBP	251	772	168	129,696
IK7RVY	305	694	185	128,390
RA6AAW	260	784	163	127,792
OM5MX	240	779	164	127,756
G3VQO	253	804	158	127,032
JM1GHT	223	780	160	124,800
UR5FAV	285	678	183	124,074
WA1LWS	277	696	178	123,888
SN9A	222	727	166	120,682
RX3RZ	266	645	186	119,970
UA3XAC	228	753	158	118,974
XE1YYD	**320**	**732**	**161**	**117,852**
UA6LJB	240	665	176	117,040
VE3XD/W4	261	702	165	115,830
DL3DRN	219	759	152	115,368
VE2AXO	217	759	152	115,368
AM5GQM	237	647	177	114,519
I2BZN	222	719	159	114,321
UAØLKD	266	867	131	113,577
WB1EDI	261	650	174	113,100
XE2AUB	306	719	156	112,164
N6RCE	276	663	165	109,395
RA3DHS	253	646	169	109,174
N9LF	298	630	173	108,990
DJ2RG	226	657	163	107,091
K8IR	266	557	192	106,944
VE6RRD	**304**	**690**	**153**	**105,570**
K2YG	268	632	167	105,544
WF5X	263	620	170	105,400
RV3DLX	238	709	148	104,932
VE7WU	202	605	173	104,665
N5BA	262	616	169	104,104
SQ8LEC	224	612	169	103,428
AD1C	209	626	165	103,290
JA3MIB	**249**	**750**	**137**	**102,750**
DM2BPG	208	702	146	102,492
W4TIJ	305	540	189	102,060
SV9FBK	206	707	143	101,101
YO7ARY	234	632	158	99,856
F6AUS/QRP	199	629	158	99,382
W3BUI	249	586	168	98,448
M5AEX	204	611	161	98,371
WBØDUL	377	622	158	98,276
SA6E	199	598	164	98,072
US1IV	215	680	144	97,920
F5LMJ	205	623	157	97,811
VE7BSM	242	674	144	97,056
RW9UU	257	670	144	96,480
F5VBT	214	665	145	96,425
WA4NMS	196	604	159	96,036
IK2RZG	218	627	153	95,931
W9AMX	265	570	167	95,190
W8RAH	252	575	165	94,875
KA5EYH	368	571	165	94,215
DL9NDV	202	654	143	93,522
PAØLSK	202	629	147	92,463
DL1KUR	203	671	137	91,927
HB9HQX	208	689	132	90,948
KØTG	280	573	157	89,961
IK2OFR	200	559	159	88,881
KA2CYN	297	565	156	88,140
SP3DOF	205	599	146	87,454
ZK1WET	**215**	**643**	**136**	**87,448**
LZ2UZ	199	624	140	87,360
DL6RBH	189	606	144	87,264
RV3IC	234	519	167	86,673
G7TMU	229	562	150	84,300
IK1/DH2SAQ	222	636	132	83,952
VE6AX	224	597	140	83,580
DL8HCO	196	595	139	82,705
UA4FX	201	575	143	82,225
IZ1ANZ	199	547	147	80,409
GIØKVO	**206**	**597**	**133**	**79,401**
RW3PN	192	571	137	78,227
JO3JYE	209	604	129	77,916
JA8JCR	201	616	126	77,616
EU1DX	195	506	153	77,418
N2ZN	223	540	142	76,680
KAØCT	239	524	146	76,504
AB4GG	216	520	147	76,440
HA6IAM	190	573	133	76,209
WC9C	213	552	138	76,176
SP6OPY	168	595	128	76,160
K5VR	202	484	157	75,988
RU9AZ/9	197	621	120	74,520
SP6BSL	167	524	141	73,884
JA1BJI	167	684	108	73,872
KØJJR	216	437	169	73,853
EA7TG	190	527	140	73,780
DK3WJ	175	576	128	73,728
W4PJW	219	484	151	73,084
LA7CL	197	503	145	72,935
DL6EBM	186	512	142	72,704
IK2WYI	183	500	144	72,000
SM7YTC	176	595	121	71,995
YL2KF	202	471	152	71,592
KL1SF	**230**	**504**	**142**	**71,568**
F6CZV	167	553	129	71,337
N8PUG	249	511	138	70,518
K6JJ	283	501	140	70,140
W6RLL	301	462	151	69,762
K8OSF	220	505	137	69,185
SM5CNQ	181	521	131	68,251
SX1R	**171**	**559**	**121**	**67,639**
DK7UM	200	539	125	67,375
OK2BWK	179	486	138	67,068
JA1XUY	175	538	124	66,712
UT4ZX	160	564	118	66,552
HA1SN	155	573	116	66,468
RW9OW	200	523	127	66,421
JA5SUD	**172**	**616**	**106**	**65,296**
9A5AEI	163	506	129	65,274
VA3JNO	196	526	124	65,224
K6BIR	251	469	139	65,191
LY4DO	**181**	**489**	**133**	**65,037**
IK2LOL	170	463	137	63,431
K7VIT	213	483	129	62,307
JH1ECF	174	477	130	62,010
VK3KE	156	472	130	61,360
LU5FD	163	528	115	60,720
YO2GL	163	498	121	60,258
OK1HL	160	498	121	60,258
F6OBD	170	475	126	59,850
RA1QX	157	484	123	59,532
KF6PKG	239	426	138	58,788
WAØRSX	233	433	135	58,455
RN3FA	173	452	128	57,856
AE4Y	206	461	125	57,625
AN3EFQ	153	479	120	57,480
JA2KCY	169	499	115	57,385
WA3KYY	192	451	127	57,277
RV4LS	149	457	125	57,125
NØI8T	213	400	140	56,000
RW4HBG	175	485	114	55,290
RW3DQC	177	419	130	54,470
WA2UET	201	385	140	53,900
IK2WFN	154	439	122	53,558
N3XL	186	408	130	53,040
9A6PJZ	140	463	114	52,782
JA6BIF	**168**	**463**	**113**	**52,319**
RA6LW	166	453	114	51,642
OK2TCW	159	414	124	51,336
DS5DNO	152	517	99	51,183
DU7/G4DUM	**136**	**580**	**88**	**51,040**
DL2YED	125	476	107	50,932
K9EMG	171	353	143	50,479
DG3RCE	143	474	105	49,770
KF4OPX	179	440	112	49,280
UA3PW	155	407	117	47,619
HA3OU	134	421	112	47,152

K3OK	180	343	135	46,305
OO6LY	134	455	99	45,045
RZ6LV	123	415	107	44,405
SP8FPK	137	379	116	43,964
SQ9AOR	131	401	109	43,709
9V1UV	**185**	**420**	**104**	**43,680**
SP6KYU	129	410	105	43,050
NU4SC	194	398	108	42,984
YO4CVV	143	390	110	42,900
UAØSR	139	425	100	42,500
IK2NCF	127	382	111	42,402
SP4DC	146	356	119	42,364
VA7CAB	163	407	104	42,328
KB3KXX	158	367	115	42,205
JA3PYC	128	445	94	41,830
DF4WC	145	369	113	41,697
SP8TJU	126	384	106	40,704
EA4BPJ	144	382	106	40,492
IK3ASM	120	376	107	40,232
OH2LZI	147	352	113	39,776
N6WS	130	370	107	39,590
DK8EY	120	391	101	39,491
IK2AUK	130	353	111	39,183
UA0LD	167	449	87	39,063
SM7ATL	108	392	99	38,808
EA7EYQ	129	346	112	38,752
DL8DZV	117	369	104	38,376
SP7TEX	130	348	109	37,932
K6DGW	223	304	124	37,696
DL1DWL	148	353	106	37,418
N2OPW	145	334	112	37,408
G6OKU	121	387	96	37,152
N9LYE	170	331	112	37,072
UT2QQ	117	390	94	36,660
JA1IZ	127	390	94	36,660
DL5ASE	120	374	98	36,652
K2MK	141	337	108	36,396
F1TRE	129	372	97	36,084
W5RW	154	343	105	36,015
FR1GZ	**115**	**346**	**104**	**35,984**
W7VXS	185	321	112	35,952
JL7IFR	132	382	94	35,908
SP3GRQ	123	337	106	35,722
IV3KSE	117	349	102	35,598
RZ9OU	140	358	99	35,442
RK6MY	103	412	85	35,020
DL6ZNG	116	323	108	34,884
MØBDQ	124	344	101	34,744
RAØCL	152	413	84	34,692
SM4UOS	117	375	91	34,125
WA6NOL	161	312	109	34,008
YL2PJ	119	352	96	33,792
7N4XCA	**150**	**395**	**85**	**33,575**
WO1N	139	324	103	33,372
EA2AVM	115	372	88	32,736
DL6UAM	103	396	82	32,472
K3RWN	143	343	94	32,242
PH3BDJ	123	300	107	32,100
RA4LE	113	313	102	31,926
FO5PS	**116**	**336**	**94**	**31,584**
PA7KAT	119	318	98	31,164
K6UM	156	314	99	31,086
9A5YY	103	327	95	31,065
JEØIUR	**128**	**331**	**93**	**30,783**
F6DZD	118	304	100	30,400
VE3EBN	118	320	94	30,080
IZØEOU/3	103	344	87	29,928
K9QH	141	301	98	29,498
N5VYS	104	324	91	29,484
OK1SI	104	334	88	29,392
PY2BRZ	117	332	88	29,216
K8AJS	123	285	101	28,785
RW4LQ	112	325	88	28,600
UR6QS	104	370	77	28,490
PS7DX	108	310	91	28,210
ABØOX	122	263	107	28,141
DL1DRD	101	325	86	27,950
RA9CRZ	98	343	81	27,783
RU4PN	105	342	81	27,702
WA4FXX	105	312	88	27,456
PY2IQ	110	304	90	27,360
E21YDP	**114**	**294**	**93**	**27,342**
W2NRA	124	297	91	27,027
VE9NC	109	266	100	26,600
DL5SWB	102	290	89	25,810
ZL4AD	**102**	**301**	**85**	**25,585**
NEØP	118	255	99	25,245
AB3AI	127	287	87	24,969
N5SMQ	109	287	86	24,682
XE1BEF	114	260	94	24,440
HB9AWS	93	330	73	24,090
K6EP	112	308	78	24,024
K6OP	132	259	92	23,828
KE5OG	161	236	99	23,364
NC6P	145	255	91	23,205
K7ARJ	118	248	88	21,824
JF1QJD	116	301	71	21,371
DL1EJD	106	256	83	21,248
DD1LJ	90	252	84	21,168
WB4M	100	249	85	21,165
JHØNEC	86	325	65	21,125
W9VQ	101	236	89	21,004
JA1CPZ	96	269	76	20,444
K1IR	86	276	74	20,424
EA4DQX	97	232	87	20,184
JA1XPU	120	288	69	19,872
VR2XLL	115	264	75	19,800
KE6QR	131	214	92	19,688
MM3KDZ	81	247	79	19,513
AB8ND	107	231	84	19,404
PT2ND	87	240	79	18,960
KAØEIC	102	205	92	18,860
N3RDV	105	218	86	18,748
JR1NKN	101	256	72	18,432
K6YK	97	232	79	18,328
WA2MNO	122	206	88	18,128
AI2P	95	225	80	18,000
K9HCK	106	220	81	17,820
AA5VU	101	262	68	17,816
IØKHP	80	243	70	17,010
YBØECT	84	253	70	17,710
OK1JN	78	260	68	17,680
AM2RY	76	255	68	17,340
PA/DK1RF	78	287	58	16,646
N3JIX	75	260	64	16,640
JA1ALE	103	237	70	16,590
JA3AVO	81	239	69	16,491
SP6NVK	87	229	72	16,488
OK2PAD	90	231	71	16,401
IK8SCR	89	207	79	16,353
VK2NU	80	276	59	16,284
KB5REX	78	223	73	16,279
WAØBNX	100	182	86	15,652
JA2AXB	93	266	58	15,428
IZ2FDY	80	218	70	15,260
RKØLWP	77	279	54	15,066
N2USM	92	191	76	14,516
SQ9ANS	71	229	62	14,198
UR5UDX	85	215	64	13,760
EA2AZ	81	219	62	13,578
JA2KPV	68	251	53	13,303
K2PH	87	214	62	13,268
DJ6BQ	76	210	62	13,020
JJ2PUG	70	207	60	12,420
VA7IRL	79	263	47	12,361
DL1JB	75	198	62	12,276
RZ9IB	75	199	61	12,139
DL8CA	75	183	66	12,078
DL5KMS	70	183	65	11,895
RX4HX	77	165	69	11,385
AA7FK	93	164	67	10,968
GW3YVC	70	192	57	10,944
SP1DTG	66	225	48	10,800
OZ1DGQ	70	175	61	10,675
K9OSH	76	185	55	10,175
OO4KMB	74	169	60	10,140
SP5XSD	64	174	58	10,092
DB8NI	68	165	59	9,735
SP1RWA	53	177	48	8,496
VK6HZ	58	171	49	8,379
JA8UON	54	200	41	8,200
RA4YJD	63	143	55	7,865
EA5ETP	62	137	57	7,809
KØALT	70	133	58	7,714
DL1ARJ	52	163	47	7,661
M3PHP	50	162	47	7,614
HB9OWL	60	174	43	7,482
W5BBR	57	135	54	7,290
VE2FFE	62	135	53	7,155
N6KW	78	117	60	7,020
DG8VE	60	130	53	6,890
N8LRG	55	142	47	6,674
SM4RLD	51	147	45	6,615
DF3IS	51	132	48	6,336
NA8W	61	115	55	6,325
LY2BOS	51	136	46	6,256
ADØK	54	130	48	6,240
LA1ZIA	44	101	43	4,343
G0HVQ	41	104	39	4,056
PA4EM	33	123	32	3,936
W8TK	48	112	35	3,920
DS5KJR	38	137	28	3,836
KC9CCG	44	99	37	3,663
RA4AFZ	43	102	35	3,570
WØZW	37	96	37	3,552
ON6OM	30	122	29	3,538
UTØFT	37	93	36	3,348
SP3RBT	40	93	36	3,348
AAØCY	52	76	42	3,192
IK7UFX	36	88	35	3,080
DGØLFG	33	101	30	3,030
IK3WUB	35	89	34	3,026
WA8SDA	40	80	35	2,800
N2UM	35	81	34	2,754
DL5AKF	28	97	28	2,716
SP9IHP	30	95	28	2,660
EW1NA	33	93	28	2,604
PR7ZZ	29	85	27	2,295
UA1WBV	29	88	26	2,288
JQ1AHZ/6	34	85	26	2,210
RN3AQ	30	74	29	2,146
NØICV	33	71	30	2,130
JA1BAS	36	84	25	2,100
KB9Q	30	72	28	2,016
HB9ARK	24	75	22	1,650
W9AKS	28	57	28	1,596
RW4HM	23	70	21	1,470
VE8AE	23	44	22	968
IT9ORA	20	44	18	792
KT4AC	23	39	20	780
N1OZF	17	42	15	630
SP3OL	12	47	12	564
N8PVL	16	22	16	352
IK3CST	13	29	12	348
HB9TJW	11	25	11	275
JA1GSQ	9	24	9	216
IKØBAL	5	12	5	60
K4WQ	1	2	1	2

SINGLE OPERATOR 80 METERS

S54E	**799**	**3,620**	**427**	**1,545,740**
OL1RY	**761**	**3,248**	**387**	**1,256,976**
9A7R	**661**	**2,892**	**364**	**1,052,688**
UY6F	**663**	**2,782**	**362**	**1,007,084**
NB1B	**657**	**2,630**	**368**	**967,840**
9A6A	611	2,588	340	879,920
DJ3IW	**584**	**2,248**	**336**	**755,328**
HA8BE	**539**	**2,270**	**314**	**712,780**
SN6C	**498**	**2,046**	**308**	**630,168**
SQ9C	439	1,718	264	453,552
F6FJE	**429**	**1,716**	**254**	**435,864**
EU1AZ	**416**	**1,712**	**252**	**431,424**
IK3SSJ	**382**	**1,526**	**242**	**369,292**
YT9M	**369**	**1,506**	**241**	**362,946**
YU7NW	345	1,402	235	329,470
UT5ST	356	1,400	232	324,800
UA3LID	**357**	**1,360**	**228**	**310,080**
RA6AFB	341	1,318	213	280,734
SP6IHE	313	1,282	212	271,784
ON9CKW	**318**	**1,286**	**206**	**264,916**
UR5KCC	321	1,252	211	264,172
LY2SA	**269**	**1,118**	**189**	**211,302**
RU6YY	285	1,080	191	206,280
HA1YI	248	1,016	179	181,864
RZ3AIR	230	892	176	156,992
YZ1TRI	213	854	157	134,078
YL1ZJ	192	772	138	106,536
CT1AGF	**177**	**754**	**137**	**103,298**
W8WEJ	250	670	146	97,820
EC4AIU	98	388	87	33,756
NØRQ	86	260	74	19,240
IK1SPR	72	286	60	17,160
NQ4K	97	234	66	15,444
JE1LFX	84	244	55	13,420
OZ6EI	45	186	42	7,812
W3/NH7C	45	98	41	4,018
EC1CTV	32	128	31	3,968

SINGLE OPERATOR 40 METERS

I4IKW	**1,031**	**5,004**	**515**	**2,577,060**
SN7Q	**888**	**4,250**	**481**	**2,044,250**
HA7UG	**749**	**3,508**	**436**	**1,529,488**

The Multi-Single NN6NN team. Left to right: N6DE, NR6N, N6EE, AK6DV, W6XK and Jenny (W0OF)

C6AKQ	**814**	**3,762**	**396**	**1,489,752**
T94DO	**620**	**2,750**	**366**	**1,006,500**
YU7AE	**640**	**2,776**	**357**	**991,032**
SP4TXI	**638**	**2,750**	**359**	**987,250**
S51CK	**653**	**2,810**	**343**	**963,830**
F4JRC	**585**	**2,520**	**327**	**824,040**
N5ZM	**596**	**2,032**	**332**	**674,624**
SP9H	431	1,776	284	504,384
W6DSQ	**529**	**1,666**	**299**	**498,134**
OHØMFP	**380**	**1,560**	**223**	**347,880**
DF1IAQ	**337**	**1,404**	**235**	**329,940**
UR8QR	**335**	**1,390**	**228**	**316,920**
SP1YGL	332	1,358	228	309,624
EW7EW	**325**	**1,406**	**214**	**300,884**
UW2F	332	1,354	220	297,880
G3YYD	**281**	**1,178**	**198**	**233,244**
US9QA	271	1,172	197	230,884
4M5F	**217**	**1,274**	**169**	**215,306**
ZL3TE	**233**	**1,356**	**158**	**214,248**
YO4GDP	**239**	**1,038**	**182**	**188,916**
CT3IA	**205**	**1,224**	**154**	**188,496**
RZ3AV	**240**	**1,008**	**181**	**182,448**
EA7BNB	**236**	**1,056**	**168**	**177,408**
USØHZ	231	968	175	169,400
JE2UFF	**211**	**1,014**	**158**	**160,212**
UA1AFZ	225	864	158	136,512
OM7PY	198	834	154	128,436
7L4IOU	**177**	**848**	**137**	**116,176**
SM3LBP	**187**	**760**	**143**	**108,680**
UN4PG	**150**	**820**	**124**	**101,680**
DJ2YE	174	710	141	100,110
EA4WC	143	634	120	76,080
K7ZD	**167**	**538**	**127**	**68,326**
JH1APZ	**124**	**662**	**99**	**65,538**
UU2CW	137	580	112	64,960
XE1YJL	**141**	**580**	**91**	**52,780**
K5DKH	**125**	**384**	**100**	**38,400**
AA9DY	**129**	**354**	**101**	**35,754**
RA3CO	100	436	78	34,008
IK3ORD	90	354	77	27,258
JH1RFM	69	372	62	23,064
CM2IZ	54	234	50	11,700
EA7CWA	50	228	49	11,172
CT2ILO	52	228	48	10,944
UR4CU	56	222	49	10,878
KI7T	58	164	52	8,528
UAØFDX	50	208	35	7,280
SP4NKJ	41	154	36	5,544
AA4VV	33	144	32	4,608
OK1FCJ	12	58	11	638

SINGLE OPERATOR 20 METERS

LY3BH	**944**	**2,326**	**474**	**1,102,524**
PY2NY	**741**	**2,188**	**432**	**945,216**
OH2LU	**746**	**1,746**	**429**	**749,034**
CX4AAJ	**638**	**1,883**	**382**	**719,306**
WØETC	**833**	**1,612**	**444**	**715,728**
KZ7X	**843**	**1,496**	**410**	**613,360**
RA6DB	**700**	**1,519**	**389**	**590,891**
ES5RY	**662**	**1,526**	**376**	**573,776**
YO6BHN	**637**	**1,430**	**356**	**509,080**
OH7MN	**603**	**1,321**	**325**	**429,325**
ES4RD	536	1,237	334	413,158
JA6WFM/HI8	**507**	**1,511**	**249**	**376,239**
UN7GCE	**459**	**1,282**	**290**	**371,780**
RU2FL	**504**	**1,164**	**316**	**367,824**
DL3BQA	**465**	**1,056**	**298**	**314,688**
KE7AJ	**477**	**905**	**306**	**276,930**
L20H	**383**	**1,120**	**234**	**262,080**
IT9CHU	**423**	**925**	**277**	**256,225**
RN6AL	446	939	267	250,713
SP3GXH	**398**	**938**	**259**	**242,942**
OM6RK	**389**	**886**	**274**	**242,764**
UT5KO	**433**	**954**	**239**	**228,006**
YU1JW	**395**	**886**	**238**	**210,868**
IZØEHL	**359**	**803**	**250**	**200,750**
CT2FSD	**331**	**788**	**248**	**195,424**
UR5WCQ	344	786	237	186,282
RX9FG	**272**	**755**	**184**	**138,920**
PT2BW	**250**	**729**	**189**	**137,781**
OK1FIA	**277**	**642**	**211**	**135,462**
EA3EYD	**274**	**613**	**204**	**125,052**
US7IB	257	580	187	108,460
OM5NA	235	532	184	97,888
DL8RCL	238	534	182	97,188
UA4PAY	215	472	176	83,072
CT4DX	216	471	173	81,483
DL1DXF	200	464	166	77,024
OH7JJT	199	445	157	69,865
SM3JUR	**208**	**450**	**155**	**69,750**
AKØA	**273**	**404**	**158**	**63,832**
RN4SS	186	387	149	57,663
IQ7TA	180	375	140	52,500
IZ7AUH	180	375	140	52,500
I4DOO	171	385	131	50,435
KØCOP	**178**	**297**	**140**	**41,580**
TF4M	**149**	**335**	**122**	**40,870**
IN3OWY	140	318	111	35,298
RAGAFZ	125	339	99	33,561
UA3PPP	133	308	107	32,956
EA3AAO	105	252	96	24,192
RU3RQ	113	239	97	23,183
USØMC	111	241	95	22,895
I1NHR	98	218	90	19,620
RV3YR	91	202	79	15,958
RAØSKL	82	226	70	15,820
JE1RRK	85	206	73	15,038
LY2CU	91	197	76	14,972
VE2DWA	86	184	77	14,168
GX5YC	83	180	77	13,860
WB4MNK	84	117	72	8,424
VK2IMM	57	159	51	8,109
JN7NSV	39	99	35	3,465
VK6APW	29	82	29	2,378
DL5CE	26	55	24	1,320
SM5QU	19	41	19	779
N7CKP	14	16	14	224
DL4DAE	5	10	5	50

SINGLE OPERATOR 15 METERS

LU7HN	**1,048**	**3,099**	**513**	**1,589,787**
S51FB	**927**	**2,412**	**503**	**1,213,236**
IV3HAX	**890**	**2,379**	**451**	**1,072,929**
K4EA	**867**	**2,250**	**458**	**1,030,500**
OH7MJU	**777**	**1,995**	**437**	**871,815**
UV8M	**779**	**1,859**	**426**	**791,934**
YO3JF	**696**	**1,715**	**385**	**660,275**
UN5J	**679**	**1,812**	**361**	**654,132**
UZ4E	648	1,565	375	586,875
RK9AX	**572**	**1,570**	**331**	**519,670**
WG8Y	**549**	**1,359**	**353**	**479,727**
CX7BF	**514**	**1,525**	**312**	**475,800**
K6LL	**622**	**1,313**	**354**	**464,802**
AN7HBP	**635**	**1,396**	**330**	**460,680**
UA4RZ	**526**	**1,254**	**349**	**437,646**
C6ALK	**544**	**1,326**	**314**	**416,364**
9A4CD	**524**	**1,379**	**301**	**415,079**
UT9FJ	**477**	**1,163**	**342**	**397,746**
JM1LPN	**487**	**1,310**	**298**	**390,380**
EX8AI	**477**	**1,308**	**291**	**380,628**
UU4J	504	1,177	299	351,923
UXØIK	504	1,116	277	309,132
SP7IIT	**383**	**1,000**	**278**	**278,000**
4X6UO	**400**	**1,152**	**235**	**270,720**
XE1L	**444**	**1,029**	**263**	**270,627**
WA7LNW	460	931	267	248,577
IK7AFM	379	901	254	228,854
CT3BD	**330**	**987**	**222**	**219,114**
YT1VP	**314**	**808**	**242**	**195,536**
JR3RIY	**294**	**801**	**221**	**177,021**
4L1DA	**332**	**944**	**187**	**176,528**
WD9DZV	**284**	**729**	**221**	**161,109**
OH8VJ	277	703	213	149,739
HG3IPA	**284**	**734**	**198**	**145,332**
9A2KD	**283**	**716**	**187**	**133,892**
ES4MM	**231**	**600**	**191**	**114,600**
YBØWWW	**234**	**691**	**157**	**108,487**
HC1JQ	**222**	**654**	**134**	**87,636**
RU4SS	230	527	159	83,793
JABLNN	**182**	**486**	**147**	**71,442**
IØQM	184	464	152	70,528
US5WEP	179	461	149	68,689
OK2PMS	**174**	**474**	**132**	**62,568**
VE3UKR	**167**	**424**	**145**	**61,480**
JH9BWC	**148**	**414**	**123**	**50,922**
NA4M	**200**	**373**	**134**	**49,982**
SP6EIY	133	357	121	43,197
LY2CG	**137**	**342**	**121**	**41,382**
GW4BLE	**125**	**359**	**92**	**33,028**
RK2FXG	**107**	**274**	**93**	**25,482**
SP4DM	97	254	84	21,336
KO1H	**113**	**201**	**90**	**18,090**
CO2GL	**105**	**229**	**74**	**16,946**
7L3KJV	79	227	69	15,663
VE3RCN	78	203	73	14,819
RA4LK	75	194	66	12,804
LW5DR	64	181	57	10,317
JH2BTM	50	136	49	6,664
UAØAZ	49	126	47	5,922
YO5TP	49	122	45	5,490
EC1AMC	42	98	41	4,018
JI8XLD	37	107	36	3,852
GI4KSH	25	75	24	1,800
YL5W	16	40	16	640
K2PAL	7	9	7	63

SINGLE OPERATOR 10 METERS

LU1HF	**1,070**	**3,172**	**505**	**1,601,860**
PY2OMS	**590**	**1,734**	**343**	**594,762**
LU5FII	**518**	**1,520**	**304**	**462,080**
LW4ESY	458	1,344	284	381,696
4Z8EE	**236**	**686**	**147**	**100,842**
HG1W	**189**	**480**	**146**	**70,080**
RN9FAV	**174**	**510**	**120**	**61,200**
NA4W	**178**	**441**	**129**	**56,889**
CT1AOZ	**130**	**311**	**115**	**35,765**
UA6ADC	**115**	**274**	**98**	**26,852**
SQ6ELV	79	209	68	14,212
UZ7HO	67	163	62	10,106
DL4SUN	30	79	27	2,133
JE2SOY	34	72	28	2,016
UU9JQ	7	18	7	126
RA2FB	5	14	5	70

ROOKIE

AB8LR	**1,084**	**1,955**	**345**	**674,475**
KB1JZU	**715**	**1,749**	**340**	**594,660**
YU1CQ	**576**	**1,779**	**311**	**553,269**
UT1HZZ	**520**	**1,153**	**317**	**365,501**
KC2NTB	**539**	**1,298**	**273**	**354,354**
OH9GIT	**306**	**815**	**203**	**165,445**
SZ1A	**312**	**649**	**202**	**131,098**
2E1OKT	**223**	**623**	**154**	**95,942**
DJ6JH	**175**	**511**	**135**	**68,985**
KB1IKD	**200**	**462**	**131**	**60,522**
K5PAX	**182**	**363**	**108**	**39,204**
DK2AB	**130**	**276**	**100**	**27,600**
KC9ECI	**101**	**160**	**75**	**12,000**
KJ1J	63	112	56	6,272
KC8UDV	29	86	26	2,236
UR4QKI/M	26	83	15	1,245

MULTI-OPERATOR SINGLE TRANSMITTER

RL3A	**2,449**	**9,860**	**663**	**6,537,180**
HG1S	**2,221**	**8,149**	**688**	**5,606,512**
UA9AYA	**2,362**	**9,292**	**597**	**5,547,324**
IY4W	**2,172**	**7,731**	**655**	**5,063,805**
OM8A	**2,136**	**7,293**	**683**	**4,981,119**
I4YSS	2,080	7,483	657	4,916,331
T77CD	**2,175**	**7,268**	**643**	**4,673,324**
6G1KK	**2,339**	**7,487**	**582**	**4,357,434**
YZ9A	**2,039**	**6,545**	**634**	**4,149,530**
J43BSF	**1,928**	**5,934**	**571**	**3,388,314**
UU7J	**1,763**	**5,590**	**586**	**3,275,740**
NN6NN	**2,015**	**5,262**	**565**	**2,973,030**
TM7Z	**1,596**	**5,137**	**549**	**2,820,213**
SK4TL	**1,455**	**4,902**	**534**	**2,617,668**
OK1KSL	**1,420**	**4,750**	**529**	**2,512,750**
DKØNB	**1,366**	**4,502**	**524**	**2,359,048**
WW4LL	**1,650**	**4,354**	**526**	**2,290,204**
OHØW	**1,401**	**4,605**	**479**	**2,205,795**
DM5EL	1,273	4,134	526	2,174,484
JE1ZWT	**1,241**	**4,115**	**483**	**1,987,545**
OT5A	**1,203**	**3,929**	**472**	**1,854,488**
WØLSD	**1,518**	**3,552**	**498**	**1,768,896**
S53P	**1,147**	**3,815**	**450**	**1,716,750**
WQ7I	**1,535**	**3,483**	**480**	**1,671,840**
RZ9SWR	**965**	**3,798**	**395**	**1,500,210**
VE5RI	**1,002**	**2,654**	**423**	**1,122,642**
TF3W	**992**	**2,595**	**407**	**1,056,165**
K3KO	790	2,339	423	989,397
VE3FJB	**769**	**2,414**	**395**	**953,530**
KT1I	**1,048**	**2,387**	**388**	**926,156**
US4QWX	792	2,398	328	786,544
LT1D	**761**	**2,249**	**348**	**782,652**
LY3VM	**666**	**2,196**	**316**	**693,936**
YT7TY	549	1,679	336	564,144
RK3WWA	**614**	**1,736**	**315**	**546,840**
NY4N	738	1,595	304	484,680
RW9UWK	512	1,796	243	436,428
LY2IN	478	1,515	282	427,230
KP2D	**483**	**1,501**	**280**	**420,280**
SP9KRT	**478**	**1,535**	**264**	**405,240**
UR4EYA	466	1,415	249	352,335
B3C	**591**	**1,788**	**194**	**346,872**
V31GW	**499**	**1,443**	**221**	**318,903**
N3KAE	**533**	**1,256**	**249**	**312,744**
SP9ZHR	351	1,233	224	276,192
RL9FYL	352	1,028	197	202,516
SM2M	316	843	214	180,402
YU7AJM	202	673	149	100,277
OH1MM	**175**	**581**	**146**	**84,826**
OK1KDO	177	597	140	83,580
W3DSX	201	520	137	71,240
OK1KMG	101	373	81	30,213

MULTI-OPERATOR TWO TRANSMITTER

LX8M	**3,047**	**10,590**	**722**	**7,645,980**
YT635A	**3,157**	**10,246**	**709**	**7,264,414**
KH6YY	**2,909**	**11,392**	**616**	**7,017,472**
Z37M	**2,965**	**9,635**	**677**	**6,522,895**
OHØZ	**2,706**	**8,837**	**726**	**6,415,662**
HF75PZK	**2,081**	**6,779**	**640**	**4,338,560**
WX5S	**2,001**	**4,860**	**571**	**2,775,060**
RK9CZO	**1,474**	**5,716**	**469**	**2,680,804**
JF2SKV	**245**	**824**	**136**	**112,064**

MULTI-OPERATOR MULTI-TRANSMITTER

LY5A	**3,394**	**11,130**	**798**	**8,881,740**
RKØAXX	**2,776**	**10,022**	**677**	**6,784,894**
G6PZ	**2,598**	**8,740**	**688**	**6,013,120**
KA4RRU	**2,260**	**6,112**	**640**	**3,911,680**
OH2K	**1,292**	**4,001**	**495**	**1,980,495**
JA6ZPR	**1,178**	**3,751**	**479**	**1,796,729**
UF3CWR	**1,123**	**3,378**	**449**	**1,516,722**

SWL

ONL383	**781**	**2,718**	**385**	**1,046,430**
DEØWAF	—	—	—	**215,534**
DE7MTP	**219**	**670**	**165**	**110,550**
DE3EME	100	278	65	18,070
ZL2001	52	165	48	7,920

CHECKLOGS

The following submitted checklogs. Thank you: 2EØATS, 4Z4TL, 9A3GX, DEØMBS, DJ3XG, DJ6NH, DL2BOV, EA5YN, EA8AG, EA8KK, EF1DQN, F1MJE, GØRKT, G6CSY, GU8FBO, HAØGK, IZ7EUB, KØHW, K8QZ, K8RT, K9TA, KE4YZE, KK6T, KY2T, M3CVN, NØLLH, NØYCY, NB6U, OK1IEI, OK1KT, OZ6TL, PY7ZY, RA6YDX, RA9SC, RD3AN, RF4R, RNØCT, RW4NN, RW4UW, RX3DTN, SM6BSK, SM6NJK, SP3LRS, SP4AQD, SP5ANJ, SP7AWG, SP7FDV, SP7HKK, SP7HQ, SP8QED, SP9CTS, SQ4CUM, SQ9UM, TA1FA, UA3DCI, UA6JD, UV7M, UX1IL, VA3VF, W6FRH, YU1RS500, YU9YM, Z35BY.

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Zero Bias *(from page 6)*

stereo AM broadcasting systems. The only amateur use I've been able to find for ISB was in slow-scan TV, in an attempt to simultaneously transmit voice and image data on the same signal. As far as I can tell, nobody in SSTV has used it for more than a decade. Plus, none of the digital folks seem to be aware of any potential digital use waiting on the horizon. So why is the League going out of its way to make an exception for a mode that nobody's used in more than 10 years? I asked K1ZZ and his response was that it's "an indication of the lengths we were going to in order to avoid any impact on 'legacy modes.' " That's great, but...

2) There's a growing group of hams out there using a mode known as ESSB, with the E—standing either for "enhanced" or "extended" (depends on who you ask). Whatever the E means, ESSB uses broadcast-quality microphones and audio equalization to bring back up the highs and lows normally filtered out by communications audio circuits in order to achieve fuller-sounding audio on a single sideband signal. Essentially, it's AM-quality audio without the AM bandwidth. Audio guru Bob Heil, K9EID, tells *CQ* he's selling lots of his broadcast mics to folks who want to operate ESSB, and several high-end transceivers have the capability to broaden their audio response to accommodate these signals. The problem is that the ESSB signal is wider than a standard SSB signal—about 3.6-to-4 kHz vs. 2.8-to-3 kHz. It's perfectly legal right now, but under the League's plan, since it's not one of the enumerated exceptions, it would become illegal, except on the FM portion of 10 meters. Admittedly, there are those who question ESSB on technical grounds, and I'm not going to enter that debate here. But the fact remains that ESSB is currently legal and the League's plan, intentionally or unintentionally, will make it illegal. As Bob Heil points out, audio is one of the few remaining areas in which the typical ham can still experiment, and a regulation that cuts off legitimate experimentation is going in the wrong direction. Yes, you could add another exemption, but that isn't the right approach, either.

Problem #3: Mixed Messages

The proposal to include specific exemptions from bandwidth limitations for specific modes goes against the basic purpose of the overall regulation-by-bandwidth proposal. Once you mix modes with bandwidths, there's no point in changing what we have now. Having "nearly pure" regulation by bandwidth, as K1ZZ describes the ARRL proposal in his June *QST* editorial, is like being "a little bit pregnant."

Forget the specific mode exemptions. The widest bandwidth we want to permit on the HF bands (outside of 29.0 to 29.7) is 9 kHz—the bandwidth of a full-carrier AM signal. The other modes we've discussed, such as ISB (if anyone ever chooses to use it again) or ESSB (which a good number of people appear to be using), will easily be accommodated in a band segment where a maximum bandwidth of 9 kHz is permitted. So either designate certain portions of the HF bands for 9 kHz bandwidth in the proposal (nothing would prevent a station from using regular SSB here), or set a 9 kHz maximum for all of the current "phone bands," and use band planning to designate areas for "legacy" or experimental modes. Either way, no one would be disenfranchised and no one would feel that the League was somehow "out to get them."

Finally, we are confident that strong, sensible band planning will minimize interference between incompatible modes — but *only* if all interest groups are represented in the discussions and all agree to abide by the results (even if they don't get everything they want) and *only* if the FCC gives band plans some teeth by specifically making it a component of "good amateur practice" to abide by them.

Regulation by bandwidth is a concept whose time has come. But it must be done equitably, in a way that won't outlaw any currently-legal activities, that leaves the door open for future experimentation, and that doesn't have mode-specific exemptions. In addition, it must be coupled with strong, sensible band planning whose observance is stated by the FCC to be a part of good amateur practice. Let's do it, but let's do it right. —73, W2VU

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our readers say

The following letter was sent to Irwin Math, WA2NDM, editor of "Math's Notes."

Reflections . . . My Biography?

Dear Irwin:

Reading your "Math's Notes" column in the January issue of *CQ* (entitled "Reflections"), initially I thought it was my amateur radio biography.

Crystal sets, and discovering a simple wire is an even better antenna for it than the funny shaped thing my parents had on the roof. And when one fully unmeshed the tuning capacitor, sometimes there were people talking to each other, sometimes there were thumps (having been told that using the feedback to the point of whistling will interfere with other radios for miles around, I at this time failed to discover how to receive those thumps properly). These people had a funny way of spelling, but it didn't take long to find out that "Dora Julius 6 Ulrich Xylophon" stood for the DJ6UX. Also, the meaning of several triple-letter groups starting with "Q" became clear after a while.

Once Ingo (these people had real names, too), DJ6UX, sent his (his parents') telephone number over the air. At this time very few houseeholds in Germany had a telephone. Despite a population of 2 million, Hamburg's telephone directory was only one volume, about as thick as the international *Callbook* print version. I started to search the telephone directory (this meant frequent walks to the nearest telephone box and waiting in the queue), and eventually found it under "P." Having no money to make a telephone call, I persuaded a nearby radio/TV shop owner, who somehow liked my interest in radio, to make the call for me.

Of course, I was allowed to pay Ingo a visit! (This was one of my greatest fears; had I only known what a friendly lot radio amateurs generally are.) After seeing Ingo's shack (all homebrew, of course) and listening to a few QSOs in AM and CW, I knew what I would do one day! I was ten years old then. There followed years of salvaging parts from discarded radios and later also TV sets. Back out went empty chassis and wooden cabinets. In hindsight I must admit to having taken apart some radios which would fetch a fortune these days. Homebrewing was a succession of trial and error and sometimes even success. I learned without being aware of it.

On weekends my parents insisted on sleeping late, and I was to make no noise. Time was spent reading books on (amateur) radio from cover to cover, with headphones on, waiting for the local hams to appear on what I by now knew to be 80 meters. This way I could soon recite by heart the "legaleese" concerning amateur radio.

After ten years of SWLing, I became DK3UZ. On 21st May this year I will have been licensed for 35 years, and I hope the magic will never go away.

These days we sort of beg people to please, pretty please, be interested in amateur radio. As a result, to the vast majority of these recruits amateur radio is nothing more than another hobby, exchangable at will. For me, having sort of grown into it out of self-generated interest and despite my environment (my parents weren't too pleased, because radio meant electricity, and electricity is dangerous they thought; and my school mates thought me funny because I didn't enjoy playing soccer in the dust or going after girls) amateur radio and CW are my life! (Just in case you are wondering, yes, I'm married, and our daughter has recently moved into a home of her own.)

Back in the '60s Germany's ham population was about 6,000, and did one lament this (low) number? On the contrary, there were moans because of the overly crowded bands, and not a single soul would have dreamt about lowering license requirements. Today there are 80,000 licensed amateurs in DL, and license requirements have been lowered down to almost non-existence in order to get even more not really interested people into amateur radio.

Mainly because of SSB it has become almost impossible for a kid—and they need to be hooked as children—to stumble into amateur radio by accident. The need for (comparatively) sophisticated receiving equipment has shut this door; digital broadcasting will make crystal sets (wow, radio without electricity, no expensive batteries!) useless, thereby banging another door shut. Confronting kids with amateur radio in schools is not without problems either. During lessons it could mean a followup of yet another set of disliked tests, and therefore is greeted with skepticism. And after school hours, as a voluntary course, it would mean giving up free time. Convincing pupils (age 12 or younger) that it could be worthwhile to spend more time in school is the rub, I think. And they must not be much older than 12, or the spark will not keep burning. Still, school is the approach with the best probability of a "lasting" impression, I fear.

Now we face a practical problem: Who has enough free time to teach amateur radio to pupils if it has to be during regular hours? Those of us who are already retired from work are too old (and uncool!) to be accepted by children age 10.

By the way, a private telephone line crossing estate boundaries was, and still is, strictly *verboten* in Germany. Crossing a road would also have incurred the real hazard of crossing power lines, which back then were still run above ground from pole to pole.

Eddi Ramm, DK3UZ

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FNB-41xs 5W Ni-MH pk 9.6v 1450mAh $54.95

For YAESU FT-11R / 41R / 51R : (Factory Brand Packs !)
FNB-38xh 5W Ni-MH 9.6v 1450mAh $49.95
FNB-38 5W Ni-Cd pack 9.6v 600mAh $29.95
FNB-31 Ni-Cd pack 4.8v 600mAh $19.95

For YAESU FT-530 / 416 / 415 / 816 / 76 / 26 etc :
FNB-25x Ni-MH pack 7.2v 1100mAh $28.95
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For ICOM IC-Z1A, T22A, T42A, W31A, W32A, T7A :
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For ICOM IC-W21A, V21AT, 2GXAT choose Black or Grey:
BP-157x / BP-131h 7.2v 1650mAh $28.95

For ICOM IC-02AT etc & Radio Shack HTX-202 / 404 :
BP-8h 3W Ni-Cd pack 8.4v 1400mAh $32.95
BP-202h pack (HTX-202) 7.2v 1400mAh $29.95
IC-8 8-cell AA case (w/ Charge Jack !) $22.95

For KENWOOD TH-F6A / F7: (Lithium ION & Charger !)
PB-42L LI-ION pack 7.4v 1800mAh $39.95
PB-42XL LI-ION pack 7.4v 3600mAh $59.95
EMS-42K Desktop Rapid Charger for PB-42L/XL $39.95

For KENWOOD TH-G71 / K, TH-D7A : (w/ Belt Clip. NEW)
PB-39h 5W Ni-MH pack 9.6v 1450mAh $54.95

For KENWOOD TH-79A, TH- 42A, TH-22A etc :
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For KENWOOD TH-235A etc. (Hard-to-find !) :
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For KENWOOD TH-78A / 48 / 28 / 27 etc :
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PB-17x 5-Watt Ni-MH pk 12.0v 1300mAh $39.95
BC-15A KENWOOD brand Fast Charger $32.95

For KENWOOD TH-77A, 75, 55, 46, 45, 26, 25 etc :
PB-6x (Ni-MH, w/chg jack) 7.2v 1600mAh $34.95
PB-8xh 5W Ni-MH w/jack 12.0v 1650mAh $44.95

For KENWOOD TH-205 / 215 / 225 / 315 etc :
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For KENWOOD TR-2500 / 2600 : (Wall charger: $ 12.95 ea)
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For ALINCO DJ-V5, DJ-V5TH : (includes belt clip)
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For ALINCO DJ-195,HP,R / 196 / 446 / 493 / 496 / 596 etc :
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For ALINCO DJ-G5TD,TH,TY / 190T, 191T,TD,TH: NEW !
EBP-36xh 5w Ni-MH pk. 9.6v 1450mAh $52.95

For ALINCO DJ-580 / 580T / 582 / 180 / 280T / 480 etc :
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EBP-20xh Ni-MH pk 7.2v 1650mAh $28.95

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Two Pairs of Meters, plus LCD Window, VRF Input Preselector Filter,
Three Key Jacks, and Dual Headphone Jacks
50 V/12 A Internal Switching Regulator Power Supply

*Photograph depicts FT DX 9000 Contest with Blue display.
Modification from 200- to 400-Watt version not available. Photo shows after-market keyer paddle, not supplied.

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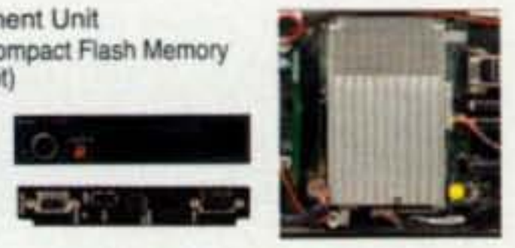
System Customization Diagrams

- TFT Display Unit
  TFT-9000

Installation of the TFT Unit requires the concurrent installation of the Data Management Unit. Installation of the TFT Unit after the date of original transceiver purchase involves an installation fee; contact WDXC for details.

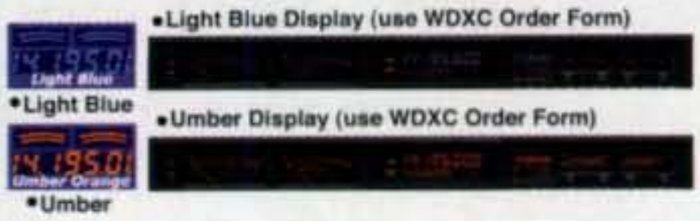
- Data Management Unit
  (Includes 64 MB Compact Flash Memory Card and Card Slot)
  DMU-9000



- External Display
  (After-market item, not supplied)
  800×600 SVGA

- PS2 or USB keyboard
  (After-market item, not supplied)

- Light Blue Display (use WDXC Order Form)
  You may specify the display color at the time of ordering (using the WDXC Order Form). Display color may be changed at a later date; modification fee will apply.



- Light Blue Display (use WDXC Order Form)
- Light Blue
- Umber Display (use WDXC Order Form)
- Umber

- External Speaker with Audio Filters
  SP-9000

- VRF Unit
  VRF-9000

- Dual Receive Unit
  RXU-9000

- RF μ-Tuning Unit A
  MTU-160
  160 M Band

- RF μ-Tuning Unit B
  MTU-80/40
  80/60 M Bands

- RF μ-Tuning Unit C
  MTU-30/20
  30/20 M Bands

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